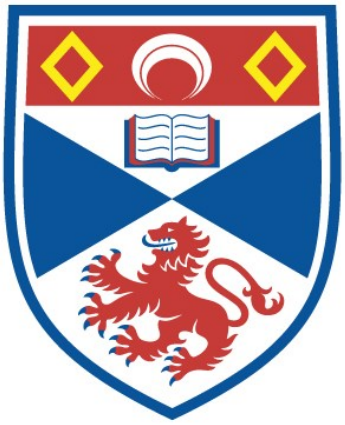
FACTORS WHICH FOSTER THE SURVIVAL OF LONG-LIVED SMALL FIRMS

Bernadette Power

A Thesis Submitted for the Degree of PhD
at the
University of St Andrews



2004

FACTORS WHICH FOSTER THE SURVIVAL OF LONG-LIVED SMALL FIRMS

VOLUME I

by

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A thesis submitted to
The University of St. Andrews
for the degree of
DOCTOR OF PHILOSOPHY

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31st August 2004

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ABSTRACT

This thesis focuses on those factors which foster the long-run survival, or continued existence, of the small firm. Using fieldwork methods, new data were gathered in face-to-face interviews with 63 owner-managers of mature small firms in Scotland (average age of 25½ years). An instrument incorporating novel ways of calibrating organisational change and performance was designed specifically for this study. The unique body of data enabled a number of new hypotheses to be tested in structural econometric models of small firm performance and growth. A mix of quantitative and qualitative data was also used to construct illustrative case studies of seven enterprise profiles.

New measures of flexibility and firm-specific turbulence are used to explain the performance of mature small firms, and Heckman sample selection estimation is undertaken of this performance equation. Performance was measured using an index constructed from Likert scales over 28 distinct attributes. It was found that firm-specific turbulence had a large negative effect on performance. Measures of flexibility (viz. agility and speed) enhanced the long run prospects of the mature small firm. Evidence of a trade-off relationship was found between measures of flexibility. Real options logic was found to be useful in interpreting the results. This evidence indicated that entrepreneurs should be alert to precipitators of organisational change, but should not act impulsively in responding to them.

The tendency of the long-lived small firm to remain small is considered using structural modelling techniques. In a three-equation simultaneous model, performance, size and a third variable (viz. market extent and size of competitive strategy space) are jointly determined. An array of system estimation techniques (e.g. 2SLS, 3SLS, H3SLS) was employed to estimate the behavioural models. A trade-off is found between firm size and performance, thus embedding this result in a larger structural model. It is found that small firms need to adjust downwards in size, and to cultivate a varied competitive strategy in niche or localised markets, to attain higher equilibrium values of performance and to promote longevity.

ACKNOWLEDGEMENTS

As in all projects of this nature there are a number of people whose support, advice, comments and critical appraisal have helped this research reach its completion.

A special word of thanks and appreciation must go to my supervisor Professor Gavin Reid for his support, encouragement, advice and comments throughout the various stages of this research over the past four years.

I would also like to thank the many owner-managers of the long-lived small firms in Scotland who kindly agreed to be interviewed as part of this study. They gave generously of their time, over the period 2001-2, allowing me to collect high quality data in the field. Without their cooperation this research study would not have been possible.

I would like to express my gratitude to Enterprise Ireland who generously funded the survey on which this research is based.

Sincere thanks to Professor Connell Fanning, Head of Department, University College Cork for his support, encouragement and advice not only during the period of this research but also prior to its initiation.

A word of thanks must also go to my colleagues in the Economics Department, University College Cork and in particular to the participants of the New Staff Development Programme – PhD Workshops whose beneficial comments on more than a few drafts improved the end product.

Thanks also go to Mary Maguire, Departmental Manager and to the other members of the Administration Office in the Department of Economics, UCC, for their help.

Thanks to participants at the following conferences for their comments on sections of this research – International Entrepreneurship & New Venture Creation Conference, Durham – European Association of For Research in Industrial Economics, Helsinki – Welsh Economic Assembly – Tinbergen Institute, Amsterdam - Irish Economic Association, Limerick.

Thank you to my PhD colleagues at St-Andrews especially Helen Paul for her good humour and friendship and to the staff of the Department of Economics, St. Andrews who welcomed me to their department while I was fulfilling my residency requirement at St-Andrews.

A word of appreciation to my family for their encouragement and support throughout the last number of years.

Finally a special thank you to my husband Bill for his endless support and understanding while I was endeavouring to complete this work.

DECLARATIONS

I, hereby certify that this thesis, which is approximately 145,000... words in length, has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

This dissertation endeavours to make a significant contribution to the existing literature on small business economics, based on empirical evidence from primary source (interview based) data on mature small firms in Scotland. Within the field of small business economics, which is inextricably linked to the broad interdisciplinary area of entrepreneurship, a number of key research themes are addressed. The chief objective is to identify factors which foster the survival, or continued existence, of the long-lived small firm.

The study initially sets out to characterise the long-lived small firm and its growth and performance. The analysis is conducted using new data gathered in face-to-face interviews with the owner-managers of 63 mature small firms in Scotland. The survey instrument designed specifically for this study incorporated novel ways of calibrating organisational change and performance. A new measure of performance is proposed which captures the fitness of the small firm to survive over the long haul. This measure of performance is used in testing two new hypotheses. The first investigates whether flexibility enhances the long run prospects of the mature small firm. To date the theoretical development of the conception of flexibility in the literature has hindered its empirical development, see Carlsson (1989). This study focuses on the latter filling this void in the literature. New measures of flexibility (viz. *agility* and *speed*) were calibrated to test this hypothesis. Performance is explained using these measures of flexibility and a new measure of turbulence, firm-specific turbulence, in a Heckman sample selection model (see Lee, 1982, 1983; Heckman, 1976, 1979; Davidson and MacKinnon, 1993). The second hypothesis considers the tendency of the long-lived small firm to remain small. It is just as important to examine this hypothesis rather than the rival one which focuses on the characteristics of fast growing firms (see Delmar *et. al*, 2003; Almus, 2002; Brüderl and Preisendörfer, 2000; Birch, 1996; Storey, 1994, 1996; Seigel *et al.*, 1993; Smallbone *et. al*, 1992, 1995; Leigh *et al.*, 1991). This is explored in a three-equation, simultaneous equation model where size, performance and a third variable, for example, market extent are determined endogenously. An array of system estimation techniques is used to estimate the simultaneous equation models (e.g. 2SLS, 3SLS and H3SLS). Finally, seven new case

profiles of long-lived small firms are presented to illustrate key aspects of the quantitative results.

Long-lived small firms are defined in this study as firms which have been trading for more than 10 years.[1] The firms examined were mature, 25½ years on average; median age is 22. Technically, they were classified as 'small' at inception since they employed less than 100 people, though in fact, the small firms in the study were much smaller, typically having less than 10 employees at inception. Thus, according to the European Commission's definition of a small firm, they were 'micro-enterprises' at start-up (employing less than 10 full-time equivalent employees) (see Recommendation 96/280/EC). At the time of interview, the long-lived small firms had 13 employees, on average, indicating some, but not substantial growth, since inception. Survival, or the continued existence of the firm, does not necessarily imply market success in terms of growth, but does not exclude this. Thus, both large and small, surviving small firms are examined in this study (see Kay, 1997). Only a small proportion of small firms grow to become large firms or 'gazelles' as denoted by Birch (1996), or 'ten percenters' as described by Storey (1996, 1997, 1998a, b)[2].

A positivist approach is undertaken in the testing of hypotheses. Thus, the existing hypotheses are challenged using new data on long-lived small firms. The thesis is divided into two volumes. Broadly, Volume I contains the main body of the thesis, whereas Volume II supplements the analysis in Volume I by presenting a copy of the survey instrumentation and seven enterprise profiles, which are discussed where relevant in the main body of the text. Volume I is structured into six parts as follows: Initially, this Part introduces the rationale, the contributions and the structure of the thesis. Part II presents relevant theory and evidence (see Chapters 2 and 3 respectively). Chapter 2 takes an interdisciplinary approach to develop a theoretical framework for examining organisational change. Chapter 3 examines theory and evidence on factors

[1] Stewart and Gallagher (1986) find that amongst small firms older than 10 years, dissolution rates are roughly constant and a firm of 70 years' standing has as much chance of dissolving as a comparative youngster of ten years of age.

[2] A 'gazelle' is a company that had a minimum of $100,000 in revenues and managed to grow at least 20% a year over four consecutive years (i.e. doubling in size over a four year period). According to Birch (1996), they represent 3% of firms in the US. Storey (1996) defined 'ten percenters' as independent companies, with annual turnover of between £5m and £100m, which grew their sales at a compound growth rate of 30% per annum over the pervious five years.

which foster small firm survival. In Part III, the sample frame is described and a survey instrument is developed, for use in fieldwork (see Chapter 4). A unique body of evidence on factors which foster the longevity of the long-lived small firm was collected. Part IV characterises the long-lived small firm and its performance and growth (see Chapters 5, 6 and 7). Chapter 5 presents a picture of the typical mature small firm in the sample and its market environment. In particular, it examines patterns of adjustment in the scale of the mature small firm over its life. The empirical relevance of Gibrat's Law is investigated as the small firm matures (see Sutton, 1997, 1998). Chapter 6 considers issues of performance measurement in a small firm context and proposes a new measure of small firm performance which is used later in econometric testing. Chapter 7 describes the evolution of the mature small firms strategy and internal organisation. Forms of key organisational change and features of end-games, such as family succession and trade-sale, are also discussed. Part V tests inferences with regard to the performance of the long-lived small firm. Chapter 8 utilises new measures of flexibility and performance to examine how small firms adapt, in the long run, to factors which impinge on it, in a way which promotes their survival and benefit. In Chapter 9, a new analysis of simultaneity between firm size, performance and other attributes, which potentially may inhibit growth, is developed. Part VI summarises the main findings of the thesis and indicates avenues for further research (see Chapter 10).

This Chapter presents information on the contributions and contents of the thesis. The development of this Chapter is as follows: Section 1.2 reports briefly on the background and the rationale for this study. Section 1.3 presents the structure and contribution of each Part of the thesis in greater detail. Specifically, the research objective(s), contribution(s) and data and methods applied (where relevant) are examined. Finally, Section 1.4 concludes this Chapter.

1.2 Background

This thesis sets out to contribute to a new emerging body of literature on small business economics. While the field of small business economics is a relatively new one, the original writings in the field of entrepreneurship to which it is inextricably

linked can be traced back to those of Cantillon (1680-1734)[3] and Say (1821)[4]. A number of other perspectives on entrepreneurship surfaced in the twentieth century. In short, Schumpeter (1934) viewed the entrepreneurial function as "*carrying out new combinations*" (p.66) and as a disequilibrating force, the source of "*spontaneous and discontinuous change*" (p.64) in the circular flow of income. Neoclassical economists, such as Knight (1921), viewed entrepreneurs as risk takers and profits as the compensation for bearing risk. In the same tradition, Marshall (1961) describes the entrepreneur as an "*alert business man* [who] *strives to modify his arrangements as to obtain better results with a given expenditure*" (p.355). In the Austrian school, the entrepreneur is an equilibrating force who "*brings into mutual adjustment those discordant elements which resulted from prior market ignorance*" (Kirzner, 1973, p.73) through "*his alertness to hitherto unnoticed opportunities*" (Kirzner, 1973, p.34). A more recent approach to entrepreneurship developed by Casson (1982) depicts the entrepreneur as a 'coordinator' that is someone "*..who specializes in taking judgmental decisions about the coordination of scarce resources*" (p.23). The Schumpeterian school considers the potential of the entrepreneur to create opportunities (i.e. new resources, goods, production techniques, organisational forms and markets), while the Austrian school considers the potential of the entrepreneur to realise profitable opportunities in the market. Though they diverge on the (dis)equilibrating role of the entrepreneur, features of these schools have greater relevance in the context of this study as they focus on the entrepreneur as the initiator of change.

Even though these perspectives on entrepreneurship emerged during the course of the twentieth century, the field of entrepreneurship was largely ignored in

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[3] Cantillon (1775) recognised three classes of economic agents: land owners, entrepreneurs and employees. A Cantillon entrepreneur is someone who exercises business engagements in the face of uncertainty. According to Cantillon, *"The farmer is an undertaker who promises to pay to the landowner a fixed sum of money ....without assurance of the profit he will derive from this enterprise"*, (see Cantillon, 1775, p.47). In this description, the entrepreneur is not the resource owner. His profit is uncertain and of a residual nature because costs are fixed and income is not.

[4] Say (1821) described the entrepreneur as the person who shifts economic resources out of an area of lower, and into an area of higher, productivity yield. In this description, Say (1821) did not only stress the importance of change and innovation within the economic system, but he described the entrepreneur as the agent of change.

mainstream economics, as neoclassical models[5] let little room for the role of the entrepreneur, see Wennekers and Thurik, (1999) and Ripsas (1998). Renewed interest in the role of the entrepreneur only arose following empirical evidence that small firms were generating new jobs (and as found later they were innovating) see Birch (1981, 1987), Brock and Evans (1986, 1989), Acs (1992), Barnes and Haskel, (2002). The study of the formation and growth of small firms became synonymous with that of entrepreneurship even though growth in the number of new small firms is a weak indicator of the level of entrepreneurship, see Wennekers and Thurik, (1999). Small firms are just one vehicle in which entrepreneurship thrives (see Drucker, 1985, Stopford and Baden Fuller, 1994). Contemporary writings in entrepreneurship extend more than ever across a number of disciplines namely, management, psychology, sociology and history (see Ripsas, 1998). Thus, the new emerging field of small business economics is interdisciplinary in nature. Certainly, in developing a theoretical framework for examining organisational change in Chapter 2 writings in management (viz. contingency theory, stages of growth models and real options logic) are considered.

In the field of small business economics, it is important to characterise long-lived small firms, as they are a stable source of employment within communities. They have passed the long run economic test of survival, which is no easy task. Only approximately two fifths (39.8%) of new small firms survive in the U.S. after six years, according to Phillips and Kirchoff (1989). A slightly higher proportion (41%) survived for ten years or more in the sample frame of small firms considered in this study (see Table 4.3). This subset of survivors has many direct and indirect linkages with local economies for a sustained period of time. In contrast, non-survivors are net destroyers of jobs whose links with local economies are ephemeral. Davis *et al.* (1996) and Barnes and Haskel (2002) show that small firms have higher job creation rates than large firms but also have higher job destruction rates. Yet to date there has been little empirical work in the small firms literature characterising the subset of small firms, which

[5] In the neoclassical tradition, changes are external to the model, whether they be changes in resources, preferences or technology. Individual agents have complete information. All markets are implicitly assumed to work perfectly well and are cleared at an equilibrium set of prices effectively eliminating the need for the behavioural function of entrepreneurship.

generate employment over a prolonged period of time. Empirical work has tended to concentrate on examining the determinants of firm formation, growth and dissolution (Evans, 1987a, b; Hall, 1987; Dunne *et al.*, 1989a) and small firm survival post entry (Mata and Portugal, 1994; Mata *et al.*, 1995; Audretsch, 1995). Isolated works by Smallbone *et al.* (1992, 1995), North *et al.* (1992) and Leigh *et al.* (1991) for the U.K. exist but are few in number. North *et al.* (1992) explored differences in characteristics, aims, products and markets of long-lived survivors and non-survivors. Smallbone *et al.*'s (1992) study descriptively examined some dimensions of organisational change and adjustments undertaken by low performing firms to survive. Leigh *et al.* (1991) undertook a similar analysis for high growth firms. Smallbone *et al.*'s (1995), using statistical tests, considered the influence of organisational adjustments on real turnover growth and, in a brief way, on change in employment. However, these studies focused on mature manufacturing firms (thereby neglecting the much larger services sector) and undertook no formal econometric testing. A gap therefore presented itself in the literature, which represented a natural means to extend existing knowledge in this area.

Evidence that policies aimed at increasing the birth rate of firms in Scotland have not been entirely successful was a further impetus for this research (*cf.* Fraser of Allander Institute, 2001). Such policies increase the level of churning in firm formation and dissolution rates in regional economies (i.e. birth rates and rates of failure are higher). On the one hand, Storey and Johnson (1986) argue that higher birth rates increase competition making it more difficult for existing local firms to generate profits and overcome the struggle for survival. Johnson (2003), in a similar vein, argues that support for new firms may displace existing businesses, not because they are more efficient, but because of policy measures which favour new businesses over existing businesses. On the other hand, Gallagher and Botham (1998) argue that increased churning leads to higher overall growth rates and that the evidence shows the quality of new starts is not the problem (in regional economies like Scotland) but the number. In their view, policies aimed at increasing the overall birth rate of a region and the promotion of high growth (or higher quality) new starts are compatible concurrent strategies. However, given the weak success of policies to try to increase the birth rate of new firms in Scotland, an alternative (or additional, rather than mutually exclusive)

approach focusing on reducing small firm death rates and extending the life of the new small firm start-ups may prove more successful as proposed by Beesley and Hamilton, (1984). Greater knowledge of the characteristics of the long-lived small firms and factors, which promote the longevity of these firms, is required to embark on this path. The results of this study should fill this void.

Further, access to the known samples of small firms which had matured since earlier interviews undertaken by Professor Gavin Reid, Director of CRIEFF, Centre for Research into Industry, Enterprise, Finance and the Firm at the University of St. Andrews, (and his research workers) provided a means of identifying long-lived surviving firms in the field. The sample frame of ninety surviving firms, (or long-lived small firms), were extracted from three 'parent' samples of Scottish small business enterprises, namely Leverhulme (1985-1988), Telephone Survey (1991) and Leverhulme (1994-1997). They provided an opportune set of known sources upon which fieldwork could be built and a means of developing work initiated by Prof. Reid (see Jacobsen, 1986; Reid, 1993; Reid *et al.*, 1993; Reid, 1996; Smith, 1997a; Reid, 1999; Reid and Smith, 2000a). Advantageously, data were also available on non-survivors, as well as survivors, gathered in earlier interviews with firms from the three parent samples between 1985 and 1997 (see respective time periods in parentheses above). This enabled estimates of the specified performance equation to be corrected for sample selection bias using Heckman's sample selection model (see Chapter 8).

The quantitative analysis of the thesis develops by examining the influence of the flexibility on the performance of the small firm. Mills (1984), Mills and Schumann (1985), Das *et al.*, (1993) and Zimmermann (1995) argue that small firms survive alongside large firms because of the relative flexibility. However, there has been a lack of empirical work in the field of small business economics and industrial organisation on small firm flexibility, see Carlsson (1989). The use of growth in new firm start-ups as a measure of entrepreneurship does not necessarily take into account entrepreneurial actions or innovative activities of small firms undertaken post entry. Early studies were preoccupied with characterising industries in which large firms had a relative innovative advantage and similarly, industries in which small firms had a relative innovative advantage, see Acs and Audretsch (1987, 1988), Acs *et al.* (1994). However, the

process by which small firms adapt and revitalise their firms in response to factors, which impinge on it, deserves further study. Intrapreneurship or corporate entrepreneurship mainly examined in the realm of large enterprises, with theories of corporate venturing, strategic renewal or "mimicking smallness" (Drucker, 1985; Stopford and Baden Fuller, 1994), is also relevant in the context of long-lived small firms. The flexibility of the firm in response to organisational change and the implications of this for the long-run prospects of the mature small firm are examined in Chapter 8.

Finally. the tendency of the long-lived small firm to remain small is considered in Chapter 9 since few small firms grow to become fast growth firms or gazelles (see Birch, 1996; Storey, 1994, 1996). To date much of the empirical work has concentrated on the characteristics of fast growth firms rather than on the tendency of the vast majority of small firms to remain small-scale operations (see Birch, 1996; Storey, 1996, 1997, 1998a, b; Leigh *et al.*, 1991; Smallbone *et al.*, 1992). To analyse this hypothesis, the relationship between size and performance and third variable inhibiting growth was considered in a three equation simultaneous model.

It is observed from above that a variety of reasons motivated the initiation and direction of this study. In general, the thesis provides an in-depth and thorough treatment of issues of longevity, and factors which foster the survival of the long-lived small firm which are discussed in greater detail below.

1.3 Contributions and Form of Thesis

Volume I of this dissertation is divided into six Parts. In short, Part II discusses the relevant literature and Part III outlines the fieldwork methods applied in the course of this study. Parts IV and V analyse the data gathered on the long-lived small firms. Specifically, Part IV presents the results of an exploratory data analysis and Part V reports on the results of inference testing (viz. flexibility analysis, simultaneous equations analysis). Part VI concludes this study. Appendix material (e.g. survey instrument and seven enterprise profiles) is included in Volume II. The discussion below concentrates chiefly on the contents and contributions of Volume I.

1.3.1 Theory and Evidence

Part II comprises of two chapters, Chapters 2 and 3, which consider theory and evidence on small firm longevity respectively. Chapter 2 develops a framework to examine how small firms respond to forces of organisational change in order to survive over the long haul. Chapter 3 examines theory and evidence on factors which foster small firm survival.

Chapter 2 is interdisciplinary in nature. Contingency theory (see Donaldson, 1994) and stages of growth models (Greiner, 1972; Churchill and Lewis, 1983) developed in the management literature are considered to shed some light on drivers of change within the firm. The most appropriate organisational form of the firm is viewed as circumstantial or contingent on precipitators of change such as the environment, strategy, size etc. Generally, these theories were developed to portray organisational change in large firms. They are rarely considered in a small firm context (see Reid and Smith 2000b; Hall 1995). It is contended that small firms survive alongside larger firms because of their relative flexibility in responding to changes in their environmental (see Brock and Evans, 1989; Piore and Sabel, 1984; Acs *et al.*, 1990). This Chapter examines the development of the concept of flexibility in the literature, building on the analysis of Carlsson (1989), in order to identify the factors underpinning this unobservable concept and to extend our framework for analyzing change in small firms. Carlsson's (1989) notion of strategic flexibility is influential in formulating our measures of flexibility in Chapter 8. The logic of real options developed in financial economics and extended in the management literature is adopted as a means of valuing strategic flexibility (see Bowman and Hurry, 1993; McGrath, 1999). The application of real options theory to value flexibility in undertaking organisational change in a small firms context is a innovative approach and useful extension to the framework for analysing organisational change. Even though higher performance is associated with firms which are more flexible (Stigler, 1989; Oi, 1961; Aiginger and Weiss, 1998) and which are active in making adjustments (Smallbone *et al.* 1992, 1995) it is argued in the literature that there is a limit on the rate of expansion (Slater, 1980; Marris, 1964; Richardson, 1964; Penrose, 1959). To complete the framework, barriers to organisational change are examined (viz. growth profitability trade-off, barriers to

growth and path dependence). In its entirety, the eclectic mix of theories presented in Chapter 2 together form a useful and novel framework for analysing how small firms respond to organisational change.

Chapter 3 examines theory and evidence on small firm survival and growth. In the mainstream literature, small firm survival has been treated as an aside issue to the literature on the determinants of firm growth (Evans, 1987a,b; Hall, 1987; Dunne and Hughes, 1994; Heshmati, 2001). Relatively recently firm survival has been given a more thorough treatment in the literature on post entry performance (Audretsch and Mata, 1995). Forces influencing post entry performance are examined at industry level (Audretsch, 1991, 1995) and firm level (Mata and Portugal, 1994; Mata *et. al.*, 1995; Boeri and Bellman, 1995; Doms *et. al.*, 1995; Storey and Wynarczky, 1996; Mahmood, 2000; Fotopoulos and Louri, 2000a) as well as on an economy wide level (Audretsch and Mahmood, 1995; Fotopoulos and Louri, 2000a; Boeri and Bellmann, 1995). The account in Chapter 3 is illustrative rather than exhaustive. Empirical studies were selected for inclusion in Chapter 3 to highlight the effect of the forces, referred to above, on firm prosperity and longevity. This thesis challenges some of the hypotheses raised by these studies with new data on long-lived small firms in Parts IV and V.

In summary, Part II contributes to the overall aim of this study by firstly developing a theoretical framework for examining organisational change in small firms and secondly by collating evidence on factors which foster the survival of the small firm.

1.3.2 Fieldwork

Part III, **Chapter 4** reports on the methodology adopted in fieldwork activities undertaken, as part of this study. It discusses the extraction of a sample frame of long-lived small firms to be interviewed. The design of the survey instrument and the data collection process is also outlined. To finish the design of the quantitative and qualitative databases in SPSS[6] is discussed in a brief way. The design of the survey instrument represents a significant contribution of this study and the vast majority of Part III, Chapter 4 concentrates on the latter. In Volume II the survey instrumentation and the data dictionary are presented as appendices to this Chapter.

[6] Statistical Package for the Social Sciences abbreviated.

The sample frame of ninety long-lived small firms were extracted, as stated above, from three "parent" samples of Scottish small business enterprises, namely Leverhulme (1985-1988), Telephone Survey 1991 and Leverhulme (1994-1997). Table 1.1 below presents summary information on the extraction of the parent sample from these three sub-samples. In total, the survey instrument contained 83 numbered questions and 5 show cards. Theory and evidence presented in Chapters 2 and 3 was influential in developing the questions. Measures were constructed to extract information on the characteristics of the mature small firm, including changes in the scale and scope of its operations, pivotal changes in the running of the firm, factors which fostered the survival of the firm and the level of innovativeness and the technological progressiveness of the firm. Two unique design features include a multi-dimensional scale where owner-mangers self appraise factors, which they believed, influenced the survival of the firm and an innovative way of calibrating strategic responses to forces of organisational change. Most of the measures included in the instrument are quantitative in nature but qualitative measures were gathered on the vision of the founders, strategies for longevity and on key organisational changes to inform the quantitative testing of inferences. After piloting the instrument, Professor Reid and the author traveled to firm sites in many regions of Scotland to meet and conduct face-to-face interviews with 63 owner-managers of long-lived small firms in Scotland between October 2001 and February 2002.[7] Almost all sectors by Standard Industrial Classification Code, henceforth SIC code, were represented, from agriculture (01) to domestic services (99), in the sample of 63 long-lived small firms interviewed. The geographic scope of this sample was extensive: Firms were located in rural regions, such as the highlands and islands, and urban regions, such as Glasgow and Edinburgh (see Subsection 5.2.1)

[7] Professor Reid interviewed nine firms in the sample and the author interviewed the remaining fifty-four firms.

Table 1.1: The Extraction of the Sample[8]

	Parent	Extracted			Survivors	
		Survivors	Non survivors	Total	Non response	Interviewed
Leverhulme (1985-1988)	86	25	61	86	5	20
Telephone Survey (1991)	160	50	63	113	20	30
Leverhulme (1994-1997)	150	15	5	20	2	13
Total	**396**	**90**	**129**	**219**	**27**	**63**

The chief contribution of Part III involved the collection of an original body of evidence (quantitative and qualitative). Detailed data on many of the measures contained in the instrument were not gathered previously for a sample of long-lived small firms. As a result these firms can now be characterised and it is possible to get a novel insight into factors, which are important for their survival, growth and performance.

1.3.3 Quantitative Analysis

Part IV reports on the results of a general analysis of the data collected using the survey instrument. It is divided into three chapters, namely Chapter 5, 6 and 7. Appropriate univariate (e.g. measures of central tendency and dispersion) and bivariate measures (e.g. measures of association and tests of difference in means) are examined in the course of this analysis.

Specifically, **Chapter 5** characterises the long-lived small firm and its market environment. It provides a more complete statistical picture of the growth experienced by these small firms over their life. A number of different measures of growth (e.g. growth in full-time employment and turnover) are used to examine the flexibility of the scale of operations of the small firm over long time horizons. Labour productivity, approximated by turnover (in pounds sterling) generated per fulltime equivalent employment, is also examined. Models inspired by Gibrats Law ("The Law of

[8] The fieldwork for Leverhulme (1985-1988) gathered data via face-to-face interviews with the owner managers of 86 new business starts in the late eighties. Of these 86 firms, 25 (29%) survived and 20 of these agreed to be re-interviewed for this study. Data on the second sample frame of 160 mature firms, members of the Federation of Small Business, in Scotland, were collected by telephone in 1991. At that time, 113 firms agreed to be interviewed. Fifty, out of the 113 firms, in this parent sample were still in business in 2001 (a survival rate of 44%). Thirty of these firms agreed to be reinterviewed. From Leverhulme (1994-1997), the third parent sample of 150 firms, 20 long-lived small firms aged 10 years or more were identified. This sample of firms consisted of new business starts, which were interviewed

Proportionate Effect)[9] are estimated in the classical form (Sutton, 1997, 1998). The results resolve conflicting empirical evidence in support for Gibrat's Law. The Law tends to hold for large firms (see Hart and Oulton, 1996) however, among small firms evidence of a clear negative relationship between firm size and growth has been found (see Mansfield, 1962; Hall, 1987; Evans, 1987a, b; Dunne *et al.*, 1989a; Dunne and Hughes, 1994). The results provide empirical support for Reid's (2001) conjecture that the small firm growth process stabilises and tends to a long run equilibrium value even though small SBEs[10] grow faster than larger SBEs at start-up phase. After approximately the first 5 years of trading, there is a shift in the growth process and SBEs grow at the market rate (i.e. independent of firm size) from that point on.

Chapter 6 examines the measurement of long run performance as it relates to the small firm. The Chapter discusses difficulties with using traditional accounting measures of performance in a small firm context (i.e. accuracy of accounting records, difficulties in distinguishing profit from income and failure to value intangible assets). To overcome the difficulties apparent in traditional accounting measures, Chapter 6 outlines the creation of a novel multidimensional measure of performance where owner-managers self-appraise the firm's performance based on 28 distinct attributes incorporating aspects of the firm's competitive environment, financial management, organisational structure, and business strategy (e.g. debt, skills, quality). The reliability of this measure of performance is assessed and factor analytic techniques[11] are adopted to examine the underlying constructs of this self-appraised measure of performance. Finally, the validity of this measure is considered through an examination of correlates with financial measures of performance and other attributes of the firm.

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originally using face-to-face interviews from 1994 –1997. Fifteen out of twenty firms, aged 10 or more, were still trading (a survival rate of 75%). Thirteen of these agreed to be re-interviewed.

[9] Much of the small firms literature has focused on the relationship between growth and firm size originating in Gibrat's Law states that growth rates are independent of firm size and its past growth history. All firm growth (large and small firms) occurs at the same rate (market rate) over an interval of time regardless of their initial size.

[10] SBE is an abbreviation for Small Business Enterprise.

[11] Factor analysis is a multivariate statistical tool that can be used to examine the underlying patterns of relationships among a larger number of variables and to determine whether or not the information can be summarised into a smaller set of constructs or attributes underlying performance (Child, 1970; Loehlin, 1992). To cope with this kind of investigation methodologists recommend the use of a statistical procedure, which comprises: (1) exploratory factor analysis; (2) reliability test; and (3) confirmatory factor analysis for validating measures (Gerbing & Andersen, 1998; Hair *et al.*, 1995).

Chapter 7 challenges existing hypotheses on entrepreneurial intentions, market positioning, size of competitive strategy space, product and process innovation, internal organisation and information technology using new data on long-lived small firms. It examines the evolution of the owner-manager's aims for the business, its competitive strategy and internal organisation. The level of product and process innovation and uses of information technologies is also discussed. New evidence on the number, type, timing and strategic importance of key organisational changes, which occurred in the operations of small firms over its lifetime is presented. Essentially, key organisational changes are interpreted as 'pivotal points' or 'crossroads', rather than crisis points. Typically, they are strategic in nature, and at one step removed from the more routinised decisions undertaken by the mature small firm on a day-to-day basis. Examples of organisational changes examined include changes in ownership, technology, location, cashflow, line of business, capacity, market positioning, diversification and management. To conclude this Chapter, potential end-games (e.g. trade-sale, family succession, employee buyout, disposal of assets) of the owner-managers are analysed. Attributes of planned end-games of long-lived small firms have only received scant attention in the past (Tajnikar and Došenovič, 2003). Existing evidence focuses on family succession rather than other potential end-games (Bjuggren and Sund, 2002; Lotti and Santarelli, 2002; Kimhi, 1997; Morris *et al.* 1997; Lansberg, 1983; Beckhard and Dyer, 1983). To the best of the author's knowledge comprehensive evidence of this nature has not been previously presented for a sample of long-lived small firms.

Part V comprises of Chapters 8 and 9, which test inferences on performance. **Chapter 8** calibrates two new measures of flexibility (*Agility* and *Speed*) and a new measure of turbulence, referred to as firm-specific turbulence. It then tests the hypothesis that flexibility enhances the long run prospects of the small firm using Heckman's sample selection model to correct for selectivity bias [Lee 1982, 1983; Heckman, 1976, 1979; Davidson and MacKinnon, 1993]. Sample selection bias exists as the measures of performance, firm-specific turbulence and flexibility are only observed for long-lived small firms and not for non-survivors. In general, the measures of flexibility (viz. *Agility* and *Speed)* were found to raise the performance of the firm.

The analysis was extended to examine the appropriateness of real options logic for explaining how the long-lived small firm responds to precipitators of organisational change (see Miller and Folta, 2002; McGrath, 1997,1999; Luehrman, 1997,1998; Bowman and Hurry, 1993). Non-linearities between measures of speed and agility in explaining performance were examined. To conduct a test for non-linearities, interaction terms were included in the Heckman sample selection model and the direction, magnitude and significance of their coefficients are interpreted. In this unique way, the empirical relevance of real options logic is considered. Specifically, the value of two guiding principles of real options reasoning which raise the flexibility of the firm are investigated: 1) The value of staging resource commitments to organisational change, limiting irreversibilities in event of withdrawal; and 2) The value of holding real options until uncertainties are resolved and the value of waiting is at its lowest (i.e. adopting a 'wait and see' approach) (see Ingersoll and Ross, 1992; McDonald and Seigel, 1986).

It has been observed that few small firms grow to become fast growth firms or 'gazelles' (see Storey, 1994, 1996; Birch, 1996) so there is a tendency for small firms to remain small-scale operations. The emphasis in the literature to date has been to study the characteristics of these fast growing firms rather than to examine the tendency of small firms to adjust downwards in size (see Almus, 2002; Storey, 1996, 1997, 1998a,b; Birch, 1996; Seigel *et al.*, 1993; Smallbone *et. al*, 1992, 1995; Leigh *et al.*, 1991), which is the focus of **Chapter 9**. Whilst, the growth and profitability trade-off has received both a lot of theoretical development (Penrose, 1959; Marris, 1964; Richardson, 1964; and Slater, 1980) and extensive empirical testing (Cubbin and Leech, 1986; Dobson and Gerrard, 1989; Cowling, 2004), even in a small firms context (see Reid, 1993, 1995, 1998) suggesting, though not conclusively, that there are diminishing returns to increasing small firm size. The implied trade-off between size and performance is examined in a more inclusive model in this Chapter for a sample of mature small firms. Earlier models are extended to include other sources of endogeneity which may explain the tendency of the small firm to remain small such as the size of the market for its product (e.g. local service) and the level of differentiation of the product (e.g. customised). The joint determination of each of these attributes

with size and performance is considered. Durbin-Wu-Hausman type tests of exogeneity are employed to test for endogeneity. The results of a number of system estimation techniques (e.g. seemingly unrelated regression models, iterated three stage least squares and GMM) are reported. Chapter 9 shows that there is a tendency to stay small or reduce in size over time to attain improvements in performance. Generally, to attain higher levels of performance a varied competitive strategy needs to be adopted (e.g. differentiating its service, producing specialist products etc.) within a niche or localised market.

1.3.4 Qualitative Analysis

Volume II illustrates the results of the quantitative analysis by presenting seven case profiles of mature small firms, which took part in the study. Whilst econometric and statistical analysis is crucial to a scientific understanding of flexibility and performance in the small firm, it is helpful to augment this analysis with qualitative evidence of the processes of change within such firms. The seven cases profiles were chosen for this purpose. Given the wealth of qualitative evidence available on the mature firms, which participated in this study, case analysis is a powerful tool to capture the evolution of these firms and to examine the practical relevance of the results founded in this study. Thus, these case profiles aid the triangulation of the quantitative results and are referred to in the body of the text in Volume I.

1.3.5 Conclusion

Volume I, Part VI summarises the main findings and contributions of this study and indicates directions for future research. It draws together the observations from the work as a whole and suggests, as appropriate, strategies or courses of action that promote the longevity of small firms and assist the firm in achieving higher performance. In a very brief way, the work also concludes with some suggestions as to how business advisors may support long-lived small firms.

1.4 General Conclusions

A number of studies show the contribution of small firms to employment creation and new small firm formation in the United States (Davis *et al.*, 1996; Murphy, 1996; Birch,1987), the U.K. (Storey, 1994; Hart and Oulton, 1996, 1998; Barnes and Haskel, 2002), Ireland (Hogan & Foley, 1996, Gudgin *et al.*, 1995; and Hart *et al.*, 1993) and in other European countries (Wagner, 1994). As a result, the continued growth and survival of the small firms sector is increasing in importance for the competitiveness of economies and in tackling unemployment. Even if the long-lived small firms in this study are not high performing, fast growth, firms it is important from a policy development viewpoint to investigate these firms and to characterise them, as they continue to hold direct and indirect links with their communities for sustained periods of time. They are the bedrock of small business enterprise.

This study gathers a unique body of evidence on long-lived small firms using a novel survey instrument. Using this evidence, it sets out to characterise the long-lived small firm, its market, strategy, and internal organisation. Potential end-games are also examined. A significant proportion of the analysis examines organisational change and the flexibility of the firm in responding to precipitators of change. New measures of flexibility and firm performance are calibrated for this analysis. The tendency of the long-lived small firm to remain small is demonstrated. Performance, size and other attributes are estimated jointly in a simultaneous equations framework. A positivist approach is undertaken in testing inferences on the performance of the long-lived small firm. Based on the findings, this thesis concludes by summarising the findings. So-called paths which entrepreneurs can follow to foster the longevity of the small firm are suggested. Although the main aim of the thesis is positivist, the evidence presented should also enable policy makers to support and educate small businesses on attributes influencing their long run survival, growth and performance. Thereby, they will be fostering economic and industrial development and sustaining linkages between small firms and their local or regional economies.

CHAPTER 2 ORGANISATIONAL CHANGE AND SURVIVAL

2.1 Introduction

The flexibility of the small firm in response to environmental change has often been cited as a competitive advantage of the small firm (see Brock and Evans, 1989; Piore and Sabel, 1984; Acs *et al.*, 1990). This thesis sets out to examine whether the flexibility of the small firm in responding to environmental change raises the long run prospects of the small firm (see Chapter 8). The aim of this Chapter is to develop a theoretical framework for examining organisational change in a small firm context. A complete theory for examining organisational change in response to environmental change does not exist. Thus, a number of related theories are examined (viz. stages of growth models, contingency theory, real options logic etc.) which together provide a unified method of examining how small firms act in response to change in their environment. By integrating these theories to form a theoretical framework to analyse organisational change in a small firms context, this Chapter fills a gap in the literature. Further, an interdisciplinary approach is undertaken to recognise the value of theories developed in the management literature where similar theories may be lacking, or underdeveloped, in the economics literature.

Initially, the concept of survival in the economics literature is defined (Section 2.2). A definition of firm survival in a long-run context is sought because the firms examined in this study are long-lived. Many of them have survived longer than their founders. Thus, a definition of survival, which allows for changes in ownership, is required (see Chandler, 1977). Over its life, the small firm is likely to have undergone a number of changes. Organisational lifecycle theories of the firm (or stages of growth models) and contingency theory developed by management theorists are outlined in Section 2.3 to provide some insights on the drivers of change in the organisational form of the firm. Stages of growth models examine internal organisational change as the firm grows in size (Greiner, 1972; Churchill and Lewis, 1983; Scot and Bruce, 1987). Contingency theory, on the other hand, was developed to explain differences that were observed in the structure of organisations in response to changes in factors such as technology, size, strategy and the environment of the firm (Donaldson, 1994). Contingency theory is perhaps a more appropriate model of organisational change because it does not assume the synchronous progression through life

cycle stages as the stages of growth models do. The relative merits of both theories are examined below.

In Section 2.4, we trace the development of the notion of flexibility in the economics literature. Early writings examined flexibility as a means of coping with fluctuations in demand (Stigler, 1939; Hart, 1950; Oi, 1961; Mills, 1984 and Mills and Schumann 1985). Later writings extended the scope of the concept to other strategic choices such as research and development and the portfolio of assets (see Marschak and Nelson, 1962; Klein, 1984 and Jones and Ostroy, 1984). In this thesis, Carlson's (1989) notion of strategic or long-term flexibility is examined. This is concerned with how the firm positions itself with respect to a larger set of potential future positions.

Following an examination of the development of the concept of flexibility in the literature, the logic of real options is considered. Real options logic was developed in the area of financial economics (Black & Scholes, 1973; Myers 1977) but was extended in the management literature as a means of valuing strategic flexibility (Bowman & Hurry, 1993; Luerhman 1997, 1998; and McGrath, 1997, 1999). The principles of real options logic are adopted to show how a manager can retain flexibility and raise the performance of the firm by holding portfolios of options until uncertainties regarding their value are resolved or the value of waiting to exercise an option(s) is low. There are clear links between Carlsson's (1989) notion of strategic flexibility and the application of the real options logic in decision-making.

Section 2.5 examines barriers to organisational change. This Section examines seminal works on the growth profitability trade-off as a limit on the expansion rate of the firm (Richardson, 1964; Penrose, 1959). It examines other constraints on the firm's rate of growth such as lack of motivation by management, lack of finance, shortage of skilled labour etc. (Barber *et al.*, 1989). Further, it examines constraints which are the result of previous choices or paths traveled by the firm. These choices have long lasting effects due to irreversibilities and indivisibilities (Antoneilli, 1997). Finally, Section 2.6 concludes this Chapter by drawing together the elements of the various theories developed. Together they form a useful and insightful theoretical framework for analysing how small firms respond to organisational change.

2.2 Firm Survival

The concept of survival in the literature is explored in this Section to define what is meant by the term 'survivor' and as a natural consequence what is meant by the term 'failure'. This analysis is developed further in Chapter 3 where the determinants of firm growth, survival and post entry performance are examined. The theoretical definition of firm survival is examined in this Chapter for clarity at this juncture since varying definitions have been proposed in the literature and adopted in empirical studies.

Alchian (1950) defines survivors as those firms, which realise profits. *"Those that realize positive profits are the survivors; those who suffer losses disappear"*(p16.) They are relatively more efficient than competitors in serving customer needs. He stated, *"the crucial element is one's aggregate position relative to actual competitors, not some hypothetical perfect competitors"* (p.16). Non-survivors are those firms, who suffer losses. They disappear or cease to trade and, as such, may be regarded as relatively less efficient in serving customers needs. Survival is determined by luck or chance factors ("*the result of fortuitous circumstances*", p.16) and also by a systematic component, which is their relative ability to serve customer needs. This view of survival encapsulates the economist's basic assumption that in the long run, firms which are loss-makers will exit the industry, whereas profit makers will continue in business. In the short run, however, those loss-makers which are able to cover variable costs, and make a contribution to fixed costs, may also survive.

The realisation of positive profits, as seen above, is the main driver of the decision of the firm to continue, or to cease, trading. If firms are earning non-negative profits over the long run they will continue to operate. According to Scherer and Ross (1990), *"over the long pull, there is one simple criterion for a business enterprise: profits must be nonnegative ... failure to satisfy this criterion means ultimately that a firm will disappear"* (p.48). This non-negative level of profit corresponds to Schumpeter's (1939) idea of normal business.

> *"A firm has a normal year if it has succeeded in earning enough to cover expenditure, depreciation, contractual interest on its debt plus remuneration of the owners' services and capital as is sufficient and not more than sufficient to induce them to go on without ever increasing or decreasing their investment."* (p. 4)

The general business situation is called normal if it allows all firms, not working under advantages or disadvantages peculiar to them, to earn about enough to cover its material, labour and capital costs. If they fail to earn a normal level of income under satisfactory conditions they will cease to trade.

Penrose (1959) in defining *continuity in the history of the firm* stated that a firm may change location, products, management, owners and legal form, yet can still be considered the same firm. She stated,

> *"In practice a firm may change its managing personnel and its owners may change, the products may change, its geographical location may change, its legal form may change and still in the ordinary course of events we would consider it to be the same firm and could write the story of its life" (p.22)*

According to Penrose's (1959) definition, a firm may be taken over by new ownership, or experience changes in management, yet continue to be the same firm, but may be unable to survive a merger. She states that the firm *"cannot survive the dispersal of its assets and personnel nor complete absorptions in an entirely different administrative framework"* (p.23). According to Penrose (1959), a merger may be classed as an expansion of the acquiring firm or the merger may be classed as leading to a new firm, depending on how the new administrative framework has been reorganised.

The definition of survival in the context of diversification and mergers is discussed by Kay (1997). He uses Chandler's (1977) definition to explain the survival of the firm, where survival is treated as to mean non-extinction; the firm *"has not been liquidated, dissolved or discontinued"* (Chandler, 1977, p.371). By this definition survival encompasses a firm merging with, or being acquired by, another firm. Chandler (1977) justifies this on three grounds: (1) that a merger or acquisition means that the firm has value as a going concern; (2) the perpetuation of existing personnel, hierarchies and the activities of the firm; and (3) hostile takeover bids do not lead to the demise of the firm who is the object of these bids - such firms are not necessarily poor performers. If survival is taken to mean continuity of existence, therefore, the merger preserves continuity and constitutes a survival strategy. The second condition above may be infringed in the case of a trade-sale of a small firm, as the owner-manger may no longer be an employee of the firm. However,

this is a little infringement as it is most likely that the activities of the firm will be perpetuated. Firm death therefore constitutes the discontinued existence of the small firm.

Chandler's definition of what constitutes a survivor is slightly broader than Penrose's definition. Once a firm is realising positive profits, and represents a going concern, it will be classed in this study as a survivor. Thus, both mergers and trade-sales are included in the definition of survival. Consequently, the survival of the firm, and the choice of the owner-managers, are divorced. This is at odds with theories of entrepreneurship which link firm entry and exit to the owner-managers decision to set up, or dissolve, a firm based on changes in the relative prices of three states employment, unemployment and self employment (see Holmes and Schmitz, 1990). A study of long-lived small firms requires a broader definition of firm survival than studies of new firm entry and exit. Otherwise, constraints are placed on the long run survival of the firm to that of the survival of the owner. Firms can survive longer than their owners in the long run, yet their activities are perpetuated and they continue to serve customer demand. Thus, the firm can undergo a number of organisational changes such as changes in ownership, changes in products, changes in location etc. and still survive. The next section looks at theories of organisational change.

2.3 Organisational Change

The aim of this Section is to examine the determinants of organisational change within the firm. Theories of entrepreneurship examined in Chapter 1 alluded to the entrepreneur as the main agent of change within the economy whether from a Schumpeterian perspective or an Austrian perspective. This Section relies on organisational lifecycle theories of the firm (or stages of growth models) and contingency theory, developed by management theorists, to provide some insights into the drivers of change in the organisational form of the firm. Marshall (1890), according to Loabsy (1990), emphasised that firms go through a lifecycle (birth, growth and dissolution). Managerial theorists such as Greiner (1972) and Churchill and Lewis (1983) developed stages of growth models or lifecycle models of the firm to illustrate internal organisational

change as the firm grows in size. Contingency theory was developed to explain differences that were observed in the structure of organisations. The appropriate form of organisation was contingent on, for instance, the technology, size, strategy and environment of the firm (Donaldson, 1994). A firm will change over the course of its life in response to changes in these contingency factors, rather than following any development pattern such as proposed by lifecycle theories. Initially, this Section will outline seminal works, and more recent papers on stages of growth models and contingency theory, before forming some conclusions on the determinants of organisational change.

2.3.1 Stages of Growth Models

Stages of growth models were developed by managerial theorists to describe the developmental sequence (or organisational lifecycle) of a new small firm (see Greiner, 1972; Churchill and Lewis, 1983; and Scott and Bruce, 1987). These models examine internal changes that will occur over the lifecycle as the firm grows in size. Such models can be used prescriptively by owners of businesses to assess the stage at which their companies are operating and to use these frameworks to cope better with both existing, and anticipated problems. These models are based on the clinical experience of their developers, the extant literature and their empirical research. Churchill and Lewis's (1983) and Greiner's (1972) models are the two best-known models and will be discussed below. It should be noted that Scott and Bruce (1987) develop this literature further with a five-stage model embodying features of Churchill and Lewis (1983) and Greiner (1972), in which transition from one stage to another is also accompanied by crisis, but limits of space preclude its discussion here.

In stages of growth models, the firm is visualised as passing through a sequence of growth stages as it grows in size. Churchill and Lewis (1983) proposed a fairly typical five-stage growth model. They labeled the stages existence, survival, success, takeoff and maturity. Each stage is characterised by an index of size, diversity and complexity and is described by five management factors: managerial style, organisation structure, extent of formal systems, major strategic goals and the owner's involvement in the business. In the existence stage, the firm tries to stay alive by attempting to gain customers for the products of the firm. Within a simple organisational structure, the owner-manager performs most

tasks, from supervising employees, to minimal levels of planning. The owner provides most of the capital with the support of relatives and friends. In the survival stage, the emphasis shifts from merely trying to stay alive, to trying to breakeven, so as to raise cashflow, to stay in business, and to finance growth. In this context, the owner-manager is still heavily involved in the business. Few formal systems are implemented. Firms can stay at this stage for a long time, earning just marginal returns until the firm closes, following the retirement of the owner-manager. In the success stage, the owner-manager must choose between 'growing on' the business and keeping the company stable and profitable, so that the owner-manager can take up other pursuits (e.g. starting other companies). If the firm chooses the latter, the firm can stay in business as long as environmental changes do not destroy its market niche. Such a firm is characterised by: the recruitment and development of functional management and systems; healthy cashflow; and the gradual withdrawal of the owner-manager from the business. Alternatively, the owner-manager can actively choose to expand the business. In this case, he installs operational and strategic planning systems, and gathers the financial resources to 'grow' the business. In the take off stage, the firm must improve the managerial effectiveness of the firm by delegating responsibility to subordinates, and by generating sufficient cash to finance growth. This is a 'pivotal' time in the life of the firm, where the firm can grow into a substantial business or, if not, it can be sold at a profit. Any weaknesses of the owner-manager are tested to the limit in this stage. To succeed, the owner-manager must delegate a significant number of tasks to competent management. The operational and planning systems are refined and the firm becomes partly divisonalised. The founder is reasonably separate from the business and may be replaced either voluntarily or involuntarily by the company's investors or creditors. In the fifth and final stage, the firm has succeeded in becoming a force to the reckoned with in the market. It has the advantages of financial resources, managerial talent and size. All management, strategic planning and operational systems are extensive and refined. It is a challenge of entrepreneurship to maintain the flexibility and spirit of a small entrepreneurial firm, or to risk ossification ["*lack of innovative decision-making and avoidance of risks*" Churchill and Lewis, (1983), p.40].

Growth is the main driver of internal change. Few references are made to the influence of the environment on internal change in this model. Only in stage III ('success') the success of the strategy to keep the firm profitable rather than expand hinges on environmental change not destroying its market niche. Flexibility is also an important capability of the firm in stage V ('maturity'). Experience of each stage is important. Whilst a franchisee may skip the existence and the survival stage, failing to experience these stages may affect their success in growing through managing multiple units. The stages in this model are not inevitable. Firms may decide not to move onto a successive stage (like in stage III 'success') or fail to move on (like in stage II 'survival'). These interpretations improve on Greiner's (1972) model, where there is a certain inevitability about moving through successive phases of growth, as the firm ages and grows in size.

Greiner (1972) builds a model of organisation development based on five key dimensions: age of organisation; size of organization; stages of evolution; stages of revolution; and growth rate of the industry. Greiner (1972) distinguishes between evolutionary and revolutionary periods. Evolutionary periods are characterised by "*long periods of growth where no major upheaval occurs in the organisation practices*" whereas revolutionary periods are characterised by "*periods of substantial turmoil in organisation life.*" (p.38). The speed at which the organisation experiences periods of evolution and revolution depends on the speed at which the firm's industry environment is growing. Greiner maintains that firms move through five phases of growth: creativity, direction, delegation, coordination and collaboration. According to Greiner (1972), each stage, other than the first, is both the effect of the previous phase, and a cause of the next phase. Signs of impending crisis herald all phases. The creative phase ends with a crisis of leadership; the direction phase with a crisis of autonomy; a crisis of control follows the delegation phase; and a crisis of red tape follows the phase of coordination. In each of these phases "*a major solution in one time period becomes a major problem at a latter date*" (p.40). Each management problem must be resolved before growth can continue. However, Greiner argues that "*evolution is not an automatic affair, it is a contest for survival*"(p.45). Firms must move forward introducing new solutions, they cannot move backwards. He argues that since each phase is strongly influenced by the previous one, management with an

understanding of the firm's history can anticipate and prepare for these developmental crises and turn these into opportunities for growth. Hall (1995) notes that Greiner's (1972) model is really about changes in response to growth and that most of the crises Greiner describes would not occur if the company had maintained stable sales and grown older.

Hall (1995), in appraising the relevance of lifecycle models of organisations such as those proposed by Greiner (1972) and Churchill and Lewis (1983), stated that (a) only the early stages of these lifecycle models are of relevance to small firms; (b) other influences than growth such as age, internal politics or factors external, but not reflected in their growth rates, may be contributing influences of organisational change; and (c) such models make too broad generalisations concerning the combinations of factors that will be found together in firms experiencing the same stage of development. The synchronous progression of life stages (and associated development formalisation), and institutionalisation of systems and policies that is portrayed in stages of growth models, seems to be a more conspicuous phenomenon among the fast growth, often high tech, or more glamorous firms (Eggers *et al.*, 1994; Kazanjian, 1988a, b) than more modest growth service firms (e.g. retailers), the modal type of business in this study.

O'Farrell and Hitchens (1988) criticise stages theories of growth from many perspectives. First, they argue that they seem little more than "*heuristic classification schemes*" rather than "*conceptualizations of the processes underlying growth*" (p.1371). Second, they contend that empirical evidence that firms often stay the same size for a number of years is inconsistent with the view that the small business will either grow and pass through all stages, or fail in the attempt. Third, the model fails to capture the early stages in the origin and growth of the company. Fourth, it is unclear whether the passage of a firm through a sequence of growth stages is a necessary progression or whether the firm under certain conditions could skip a stage. Fifth, the studies typically only rely on one size measure (i.e. company sales) rather than the wide number that are available. Sixth, most stage growth models are 'aspatial'. Seventh they hold that the body of literature is discursive and wisdom based. Finally, they state that there is a lack of empirical testing of the corporate lifecycle or stages of growth models which is often presented as having an assumed validity.

While Miller and Freisen (1982, 1984) found some support for organisational lifecycles, Drazin and Kazanjian (1990), Kazanjian (1988a, b), Birley and Westhead (1990) and Dodge *et al.* (1994) only found limited support. Rather than examining the applicability of each stage of these models, the underlying theme is that as the firm grows in size, it faces new challenges or crisis, which need to be overcome by internal changes to manage this growth. Models proposed by Churchill and Lewis (1983) and Greiner (1972) recognise that firms experience pivotal points or periods of transition, whether as a result of growth in size, or otherwise. Contingency theory described in the next section is a theory of organisational change, which does not rely on the synchronous progression through life stages.

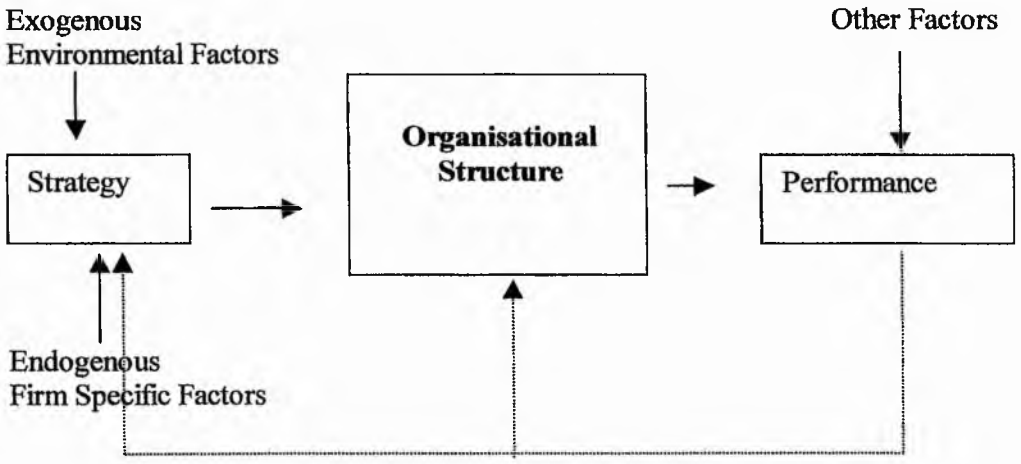
2.3.2 Contingency Theory

Contingency theory, with its foundations in management theory, originated in the writings of Burns and Stalker (1961) and Woodward (1965). It was developed to explain differences which were observed in the structure of organisations. Contingency theory holds that the most effective organisational structure would vary according to the situation of the organisation (see Donaldson, 1994 p.xi). The organisation reacts in predictable ways to the conditions which surround them, adjusting their purpose and shape to meet market and other environmental characteristics (see Miles and Snow, 1978). A number of these conditions have been identified and are called contingency factors. The structure of the organisation is contingent, or dependent upon the contingency factor or factors. Prominent contingency factors in the literature, according to Donaldson (1994), include task uncertainty, size, decline, strategy and environment. Figure 2.1 below presents an illustration of a basic contingency framework, adapted from Andersen and Lanen (1999). It shows, in a brief way, how contingencies or 'precipitating influences' within the firm (e.g. technology, organisational culture) and in its environment (e.g. competition and environmental uncertainty) affect the firm's strategy, organisational structure and performance.

Early studies examined features of task uncertainty. Burns and Stalker (1961) interviewed key people in 20 industrial firms in the UK operating across a number of sectors, ranging from electronics producers, to a rayon manufacturer and a large

engineering firm. They examined how the pattern of management practices varied with the characteristics of the firm's external environment. Burns and Stalker (1961) identified a continuum of organisational forms, ranging from mechanistic to organic, in which the appropriate organisational form varied with the level of environmental uncertainty. The mechanistic form was more appropriate for stable environments and was characterised by defined hierarchy, set tasks and functional roles. In the organic form, more flexible forms of organisation were required to deal with changing environment (e.g. tasks were redefined continually, communications between personnel run laterally as well as vertically, and omniscience could no longer be imputed to the head of the firm).

Figure 2.1: A Basic Contingency Framework



Woodward (1965), in the study of manufacturing firms from South Essex (greater than 100 employees), detected a relationship between technology and the structure of successful organisations. Different technologies, according to Woodward (1965), imposed different demands on organisations and on individuals. These demands may only be met by different organisational structures. Woodward developed a technological scale, which grouped firms according to their techniques of production and the complexity of their production systems. This scale ranged from unit or small batch (e.g. special purpose electronic equipment and custom tailored clothing), through to large batch or mass

production (e.g. standardised electrical components, standard gasoline engines), to continuous process production (e.g. chemicals and oil refining). The successful firms in each of these three broad groupings were found to follow similar management practices. She concluded that a mass production technology requires a highly functionalised structure and a large administrative component, with a wide span of control, whereas a unit technology is usually accompanied by a flexible organisation structure that has a small administrative component, and a moderately broad span of supervising control.

Subsequently, Lawrence and Lorsch (1967) gave precision and refinement to the general idea that certain organisations need to be more organic and flexible than others, suggesting that the degree of flexibility required varies from one organisational sub-unit (e.g. sales, research and production) to another. They studied high- and low performance organisations in the standardized-container industry, the food industry and the plastics industry, which were respectively experiencing low, moderate and high rates of growth, technical change and market change. They found that successful firms in uncertain environments (e.g. the plastic's industry) required an organic organisational form (with high differentiation and more elaborate integrative mechanisms to coordinate subunit activities), and success in more stable environments (e.g. the container industry) required more mechanistic forms (less differentiation and less elaborate integrative mechanisms). The subsystems were differentiated from each other in terms of subsystem formal structures, the member's goal orientation, the member's time orientation (long or short term view) and member's interpersonal orientation.

While the above studies dealt with task uncertainty, Chandler (1962) illustrated through comparative analysis of case histories of pioneering firms, like DuPont, General Motors, Standard Oil (New Jersey) and Sears Roebuck, that organisational structure follows from, and is guided by, strategic decisions. New strategic choices arose from environmental changes in population, income and technologies. Different kinds of organisation were seen as appropriate for different types of circumstances. For example, Chandler (1962) found that as companies move from being undiversified to being diversified in their product range, they move from being organized along functional lines to the product divisional form. He shows that organisations may delay adoption of structural

change until poor performance prompts structural adaptation. Donaldson (1987) formalises this theory of mal-adaptation in his SARFIT (Structural Adjustment to Regain Fit) model where he describes a cycle of change in strategy (or another contingency factor) leading to 'mismatch' or 'misfit' and low performance, which is then rectified by structural adjustment to achieve a closer fit between the contingency factor and structure.

Miller (1987), in reviewing a number of studies on the contingency of size, shows that the 'size-bureaucratization relationship' holds across a variety of organisations and countries. The larger the size of an organisation, in terms of number employees, the more likely it was to adopt a bureaucratic structure. Thompson (1967) held that the environment shapes the firm's organisational structure. The more variable and unpredictable the task environment, the more flexible the organisational structure must be. Donaldson (1994) provides examples of mechanisms by which a firm can influence its environment, such as through merging with another organisation or through selective appointment of outside members to the board of directors of the organisation. The scope of the contingency theory continues to be expanded, for example, to management accounting systems and practices (Mitchell *et al.*, 2000; Andersen and Lanen, 1999; Hayes, 1977; Gordon and Miller, 1976), to entrepreneurial orientation (Lumpkin and Dess, 1996), to strategic planning and organisational learning (Kloot, 1997), to reward systems (Boyd and Salamin, 2001) and export venture creation (Ilbeh, 2003).

The earlier studies were static, in that they overemphasised reactive adaptation to contingencies, and ignored the opportunity firms have to influence their environment. It was Child (1972) who explicitly argued for a less rigid view of the interaction between organisations and their environment. Child (1972) argued that individuals have the power to reshape their environment. He called for a strategic choice approach to organisation-environment relations. Volberda (1998) outlines a dynamic contingency theory, relaxing the unrealistic assumption that agents are incapable of shaping their environment. This theory of dynamic contingency is characterized as one that (1) views managerial choice or strategic choice as the primary link between organisation and environment, (2) focuses on management's ability to create, learn about and manage an organisations environment and (3) encompasses multiple ways in which organisations interact with their environment

through a process of mutual adaptation between the organisation and its environmental domain. According to Volberda (1998), from this perspective, flexibility does not result in suboptimal firm resources, thus leaving the firm vulnerable to competitors with cost focus or differentiation focus strategies. Rather, it stabilises firm performance and increases the probability of firm survival when the environment is changing and uncertain.

Support has been found for contingency theory in a small firms context. Reid and Smith (2000b) found evidence of the applicability of contingency theory for a body of small firms data. They found evidence that the timing of contingencies such as a cashflow crisis, funding shortage and innovation correspond to the timing of information system development such as cost management and computer applications. They found evidence from cluster analysis of three types of firm described, as 'adaptive', 'running blind' and 'stagnant', which are characterised by their decision making style, the uncertainty of their environment and organisational structure. For example, the adaptive firm functions in a dynamic environment where decision-making is correspondingly dynamic and its organisational structure is decentralized. At the other end of the continuum, the stagnant firm operates in a stable environment, its decision making style is conservative, and its organisational structure is strongly centralized. They also demonstrate that organisational development, as proxied by a weighted headcount measure, can be explained by a range of contingent variables (e.g. based on production systems, business strategy and market environment).

2.3.3 Conclusions

The lifecycle models and contingency theory describe internal change in the organisational form of the firm. In the lifecycle models, this is driven by firm growth in size. The firm reaches a crisis point or a pivotal point in its growth cycle, which precipitates changes in the how the firm is organized. Examples include more formal operational and planning systems or the delegation of tasks, so that the firm can grow or progress to the next stage. These pivotal or crisis points are periods of major upheaval or transition in the life of the firm. Empirical evidence has called into question the relevance of the sequential development pattern proposed by stages of growth models, but has not

questioned the fact that firms experience periods of internal change or transition. In these lifecycle models, growth is the chief precipitator of organisational change.

Size is also an important precipitator of internal change in contingency theory, but it is not the only precipitator. Other precipitators include the environment, task uncertainty, strategy etc. Static contingency theory views the firm as reactive to changes in these contingency factors rather than dynamic contingency theory where the organisation has the ability to shape its environment or these contingency factors. The main point of this body of knowledge is that the most appropriate organisational form for the firm is circumstantial or contingent. Contingency theory is a broader theory of internal change than stages of growth theories and thus it is more applicable to examining organisational change within the small firm. It has also been shown to have empirical relevance in the context of small firms.

Given the arguments in the literature examined thus far, it is assumed in this study that internal organisational change takes place at pivotal or crisis points in the firm's lifecycle. However, the synchronous progression through lifecycle stages is not given much weight. The emphasis is placed on a contingency theory of organisational change, where the organisational form of the firm is contingent on its environment, its strategy, its size etc. The organisational form changes in response to changes in contingency factors, or precipitators of change, so that there is a closer fit between the organisational form and its environment. If change in a precipitator lags behind change in the organisational form, the risk of poor performance causes the firm to adapt.

A more flexible or organic organisational form is required if the firm is operating in an uncertain environment or if its production technology is unit batch or bespoke. The technology of small (as opposed to large) firms is more likely to be characterised by unit batch rather than mass production. According to the findings of contingency theorists, a more flexible or organic organisational form seems to be most appropriate for the small firm operating in such uncertain environments. The next Section examines the development of the concept of flexibility and its value in organisational decision-making.

2.4 Flexibility

This Section examines the development of the concept of flexibility in the economics literature and identifies clear links between aspects of firm flexibility and real options reasoning. Carlsson (1989), in his survey of the literature, breaks it down into two branches of thought. The first, and possibly the largest, examines aspects of flexibility which concern the ability of firms to cope with fluctuations in demand for their output (Stigler, 1939; Hart, 1950; Oi, 1961; Mills, 1984 and Mills and Schumann 1985, Das *et al.*, 1993; Zimmermann, 1995). The second, extends the applicability of the concept of flexibility to other strategic choices (e.g. choice of research and development, plant and portfolio of assets) that influence the cost moving from one position to a larger set of potential future positions (see Marschak and Nelson, 1962; Klein, 1984 and Jones and Ostroy, 1984). It is the later notion of flexibility which visibly relates to real options reasoning (Bowman and Hurry, 1993; Luehrman, 1997, 1998; McGrath, 1997, 1999). Following an examination of the development of the concept of flexibility in the literature, the development of the logic of real options is examined as a means of valuing strategic or long-term flexibility (see Carlsson ,1989).

2.4.1 Concept of Flexibility

Initially, the notion of flexibility as a means of coping with fluctuations in demand for output is examined before wider conceptualisations are outlined. Stigler (1939) introduced the notion of flexibility into the literature. He defined flexibility as those attributes of a production technology which accommodate to greater output variability. He stated, *"Adaptability can ..be built into a plant, and entrepreneurs in trades where fluctuations are frequent and great will endeavor to secure flexibility in their operations"* (p. 310). According to Stigler (1939), a firm's choice of cost structure determines its level of flexibility. The shape of the cost curve determines how responsive output decisions are to price changes. Therefore, Stigler (1939) argued that flexibility is greater with flat-bottomed average cost curves, and flat or gently inclined marginal cost curves, in the context of U-shaped cost curves. However, Stigler (1939) holds that flexibility is not a free good, it comes at the expense of higher unit costs: *"A plant certain to operate at X units per week will surely have lower costs at that output than will a plant designed to be passably*

efficient from X/2 to 2X units per week" (Stigler, 1939, p. 311). Mills (1984) examined this cost tradeoff between flexibility and static efficiency where the choice of flexibility in the cost curve is endogenous. He demonstrated that firms faced with price variability in their market would prefer greater flexibility, even at the expense of lower static efficiency. Conversely, with little or no price variability in a market, he argued that the firm would opt for a cost curve that is less flexible and allows more static efficiency.

Central to Stigler's notion of flexibility is the idea that expected profit will increase with greater flexibility in the presence of demand uncertainty. Oi (1961) illustrated that expected profits are greater with higher variability of prices in a single product firm with increasing marginal costs. Further, Aiginger and Weiss (1998) found, for a sample of US 4-digit manufacturing industries, that flexibility of labour demand has a positive influence on price cost margins suggesting that it pays to be flexible. Thus, these findings suggest that the more flexible a firm is, the higher its expected performance. The marginal gain is greater the higher is environmental uncertainty (Hart, 1950). Greater flexibility is preferred to less flexibility, when the environment is uncertain. The latter is likely to be relevant to small entrepreneurial firms.

Mills and Schumann (1985) developed a model where the existence of available technologies affords a tradeoff between static efficiency and flexibility so that in market environments with fluctuating demand it is possible for firms with higher minimum average cost to survive if they were sufficiently flexible. Technologically diverse firms are able to compete with each other by relying on offsetting cost advantages as a result of this tradeoff. This technological diversity was associated with smaller sized firms because they use variable factors of production more rigorously than large firms. Larger firms adopted more static technologies to avail themselves of economies of scale. Therefore, Mills and Schumann (1985), allowing for larger diversity between rivals, associated the notion of greater flexibility with smaller, rather than larger firms. He stated,

> "*small firms are able to compete successfully with large firm, more static efficient producers by absorbing a disproportionate share of industrywide output fluctuations. This is possible because small firms use production technologies that are more flexible than those chosen by large firms. Large rivals own the comparative advantage of lower minimum average costs due largely to scale economies, while small competitors have an offsetting*

advantage in their superior responsiveness to cyclical or random swings in demand" (p.766)

This source of flexibility enables small firms to thrive in uncertain environments. Mills and Schumann (1985) showed empirically that there existed an inverse relationship between flexibility and firm size using a measure of sales variability and employment variability over time to approximate flexibility[1]. More recent empirical applications by Das *et al.* (1993) and Zimmermann (1995) also show that small firms are more flexible than larger rivals.

The scope of the notion of flexibility was widened to cover other choices sets than strategies to cope with fluctuations in demand. An early study by Marschak and Nelson (1962) extended the applicability of flexibility beyond the choice of production technology to all sources of uncertainty. They developed three alternative definitions for flexibility. The first definition examined the size of the choice set of the firm. They held that "*a highly flexible initial action preserves many choices*" (p. 45). In other words, a more flexible initial action enables more choices for action in future periods. The second definition focused on marginal cost. According to Marschak and Nelson (1962), an initial action is more flexible if it is less costly for a flexible plant to move toward another position in the future. The final definition emphasised marginal expected profit. It argues that an initial action is more flexible if a more flexible plant generates more profits or smaller losses in moving to the next position. The first definition should not contradict the second and third definitions. Thus, initial actions should be chosen such that they open up more future choices in a cost effective and revenue maximising manner. Marschak and Nelson (1962) also argue that more flexible initial actions should be chosen if there is greater uncertainty, as these will yield higher expected profit. Their approach anticipates the real options approach, as they focus on flexibility as that "*characteristic of early decisions in a sequential chain which permits the decision-maker to adjust and take advantage of the information he receives as time elapses*" (p.56-57).

[1] This was taken as the standard error of regressions adjusted for serial correlation where the natural logarithm of annual sales (or employment) from 1970 to 1980 for a sample of 856 manufacturing firms was regressed onto a constant and a linear time trend. See Mills and Schumann (1985).

Jones and Ostroy (1984), building on Marschak and Nelson's concept of flexibility, held that "*One position is more flexible than another if it leaves available a larger set of future options at any given cost level*" (p.13). They also argued that, in the face of greater uncertainty, a firm will choose an option which offers greater flexibility "*the more variable the decision maker's beliefs the more flexible is the position he will choose.*" (p.13). They claimed that this is particularly the case when: (1) there will be opportunities to act after further information is received; and (2) when current choices influence either the attractiveness, or availability, of future options. This logic is clearly in line with real options reasoning where firms retain flexibility in their decision-making, holding real options until uncertainties regarding their value are resolved.

Klein (1984) demonstrated that there are strong links between risk and uncertainty and two types of flexibility. Type I flexibility was risk related. In this case, firms positioned themselves to cope with foreseeable events. For example flexibility built into the production processes enables production lines to produce a number of types of products in response to fluctuations in demand. Type II flexibility is related to uncertainty. It concerns the ability to make good use of newly disclosed opportunities such as new product ideas. Newly disclosed opportunities are not predictable. Thus, entrepreneurs are required to be alert to new ideas and feedback from existing processes. Klein (1984) argues that a firm which is flexible according to Type I flexibility, is unlikely to be flexible according to Type II flexibility. A firm which is an efficient producer of a given set of products is likely to be slow to respond to fundamental product change.

Carlsson (1989) operationlised the concept of flexibility based on in-depth interviews with plant managers of 13 manufacturers in the metalworking industry in the U.S. He questioned them on three typologies of flexibility namely, operational (short term), tactical (medium term) and strategic (long term) to bridge the gap between abstract theories and empirical fact. He defined these three types of flexibility as follows:

> "*A company which is flexible in an operational sense is one which has the inbuilt procedures which permit a high degree of variation in sequencing and scheduling, etc..... [where as] tactical flexibility is built into the technology, i.e. the organization and production equipment of the firm and enables it to deal e.g. with changes in the rate of production or in product mix over the course of the business cycle, as well as moderate changes in*

design.....[and strategic flexibility] reflects how the firm positions itself with respect to a menu of choices for the future." (Carlsson 1989, p.186-187)

A firm is operationally flexible if in the short run the firm has the ability to alter daily routines (e.g. scheduling, sequencing, processing etc.). Tactical flexibility is inherent in the production facility and technology. A firm is flexible in a tactical sense, if the production technology is designed so that it enables the firm to respond to changes in demand and moderate changes in product design. The entrepreneur chooses a production technology based on his expectations about variation in future demand for products, the prices of inputs, capacity requirements and the actions of competitors etc. Strategic flexibility reflects how the firm situates itself to avail of future opportunities, challenges, new game plans or real options. It includes the ability to introduce new products quickly and cheaply, to accommodate basic design changes and a willingness to accept change and risk by employees.

There is not an exact correspondence between Carlsson's (1989) three typologies of flexibility and other definitions in the literature. Carlsson's outline of tactical flexibility is similar to Stigler's (1939) notion of flexibility and other conceptualisations on which this notion was based, see Hart, (1950), Oi (1961), Mills (1984) and Mills and Schumann (1985). Operational and tactical flexibility are mainly designed to insure against foreseeable events and therefore are more similar to Klein's (1984) type I flexibility. Strategic flexibility hedges against unforeseeable events and thus, most likely corresponds to Klein's type II flexibility. One way to hedge against unforeseeable events is to hold a portfolio of real options (McGrath, 1999).

This thesis chiefly examines the degree of the strategic flexibility of the small firm rather than tactical and operational flexibility because the organisational changes examined are strategic in nature rather related to the production technology of the firm or the daily routines of the firm (see Subsection 4.3.3). In examining flexibility in the theory of the firm, Carlsson (1989) argued that flexibility is not necessarily inherent in small firms. Rather, it arises from the ability of small firms to immobilise variable factors of production to mount a quick response to detected changes in their environment because of the

existence of few organisational barriers to change in small firms. Relevant to Carlsson's perspective on strategic flexibility is Ghemawat's (1991) view on the source of firm flexibility. Ghemawat (1991) claims that flexibility arises from the expected added value, which the firm can generate from revising its strategy. It does so by being equipped to adopt alternative courses of action, as the outcomes of uncertain events unfold. Although Ghemawat (1991) developed the idea in a corporate context, it is also entirely applicable to the small firms' case. Thus, it is as true for small firms, as for large firms, that the value added created by flexibility arises in some sense from 'the degree of preparedness'. Specifically, this refers to the ability of the firm to commit the necessary resources to pursuing different courses of action. Flexibility, in this sense, arises not from the optimisation of strategy, but rather from the selection of strategies that can be adapted to a range of critical outcomes (i.e. holding a portfolio of real options) and from staging commitments to these strategies. The logic of real options underlies many recent conceptualisations of the notion of flexibility, particularly notions of strategic flexibility. The next Sub-section discusses how the logic of real options when applied in decision making can raise the strategic flexibility of the firm.

2.4.2 Logic of Real Options

With its micro foundations in financial economics (Black & Scholes, 1973; Myers 1977; Dixit & Pindyck, 1994; Brealey & Myers, 1996), real options theory was developed in the management literature as a means of valuing strategic flexibility (Bowman & Hurry, 1993; Luerhman 1997, 1998; and McGrath, 1997, 1999). The latter argue that firms can retain flexibility in their decision-making, particularly in the face of uncertainty, by viewing decisions through a real options lens. In this Sub-section, the logic of real options is used to explain how an owner-manager may raise the performance of the firm by adopting such an approach to decision making.

Options contracts were developed in order for individuals to retain the right to future investment choices, without being obliged to invest immediately, when uncertainties exist regarding the future value of assets (Cox and Rubinstein, 1985). An option is a right, but not an obligation, to buy or sell a specified asset at a pre-specified price (or the exercise price) on a specified date (Brealey and Myers, 1996). Call options (or options to buy) and

puts options (or options to sell) are familiar examples of contracts that allow investors to hold a choice open, at the risk of losing only the small investment made to purchase the option. The ability to delay the decision about whether to buy, or not to buy, an asset until the maturity date of the option introduces flexibility into this financial instrument. By the time the maturity date arrives, uncertainties regarding the true value of the asset may be resolved. In any case, increased volatility of the underlying asset increases the value of the option, because the potential gains are greater while the costs to access them remain the same. The upside becomes greater, but the potential losses become no worse (Fama & Miller, 1972).

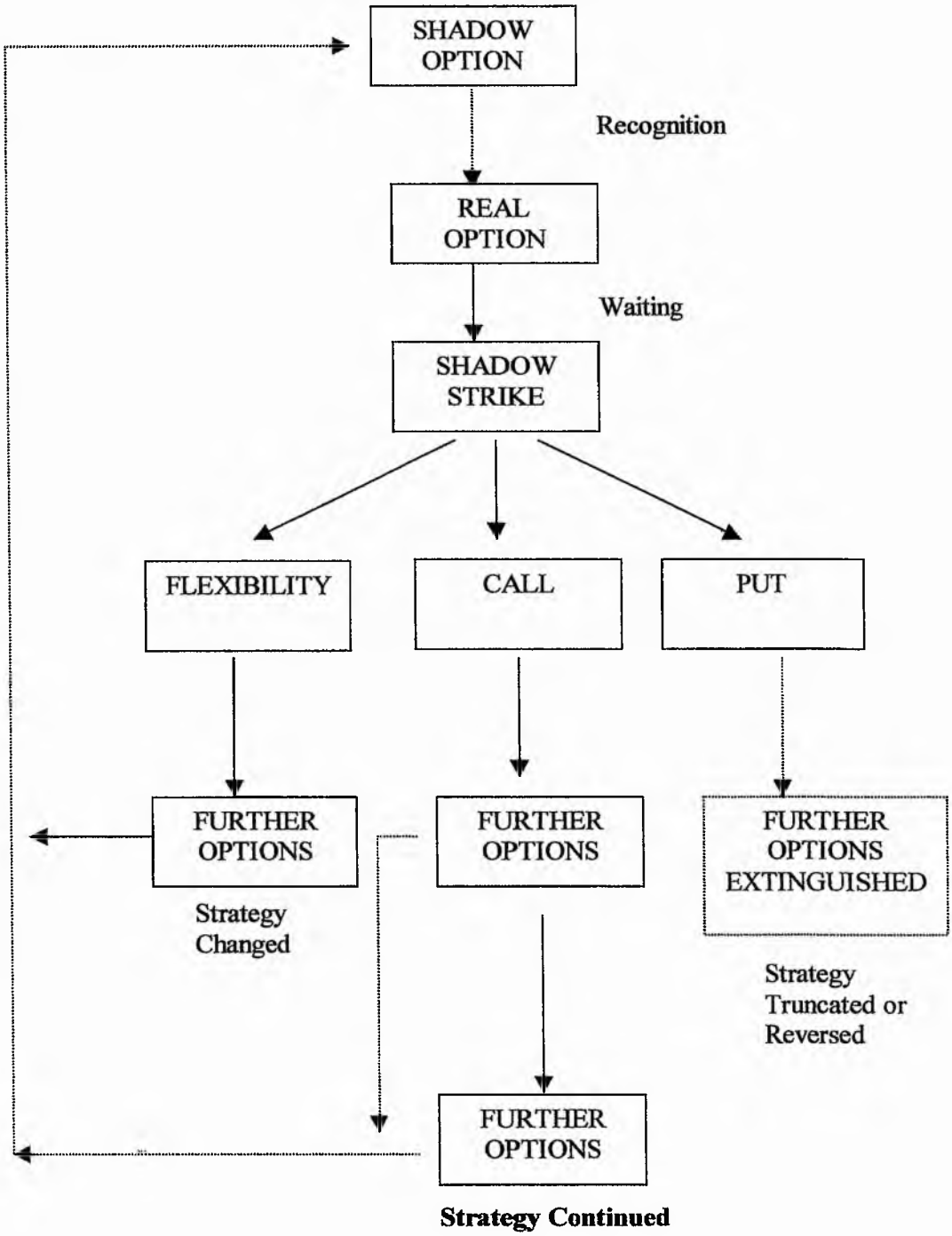
In early writings, Black and Scholes (1973) developed stock option valuation formulas, while Myers (1977), recognising the similarity of stock options and organisational resource investments, extended the valuation process to include investments in organisational resources. The latter form of option was referred to as a real option, because typically it involved investments in real strategic assets. It provides the firm with the same kind of flexibility that a stock option provides someone investing in stock. The owners of real options have the right, but not the obligation, to expand or contract their investment in a real asset at some future date. Examples include a manufacturing plant, a distribution centre, or a firm's reputation. All of these assets are real but none are traded in liquid markets. This makes it difficult to calculate the variance in the price of the underlying asset. Furthermore unlike financial options, real options do not usually have prespecified exercise prices and maturity dates. Rather the exercise price and maturity date are factors that are at least partly under control of the firm that is creating the real option. Traditional stock valuation formulas relied on assumptions that the underlying asset on which the option is written must be priced, this price must be known and the asset must be continuously tradable (Black & Scholes, 1973). These assumptions do not hold in the case of real options. The price of a real option is not known because it is not continuously tradable. Dixit and Pindyck (1994) illustrate how the value of a real option can be

approximated by finding a twinned traded asset which has the same risk profile as the project and using the implied cost of capital.[2]

Real options theory was developed to explain how the value of a project, or new investment, could be augmented by valuing flexibility in the entrepreneurial decision-making process (Luerhman 1997, 1998). Flexibility, by allowing the firm to add value by building on good fortune or mitigating bad, increases the value of a project. Bowman and Hurry (1993) use an options approach to show how strategies emerge from an organisation's resources and unfold over time in different ways. According to Bowman and Hurry (1993), *"options came into existence when existing resources and capabilities allow preferential access to future opportunities"* (p.762). They describe an incremental choice process where the firm first recognises the existence of a shadow option through retrospective sense making and then adopts a 'wait and see' policy until the option materializes [see Figure 2.2 reproduced from Bowman and Hurry (1993) p.764]. During this 'wait and see' period any uncertainties are hopefully resolved. The firm also uses the time to develop the skills to exploit the option. This may involve small investments. On maturation of the option, the firm makes a much larger investment to fully activate the option. Once the option is struck, new options for future exercise arise. Bowman and Hurry (1993) hold that the sequential striking of a chain of options forms a *strategy,* as each option which is exercised provides preferential access to the next option in the chain. They categorise these options into incremental options and flexibility options. Incremental options are calls (options to invest) and puts (options to abandon). Flexibility options represent choices to switch investment streams or change strategy. This incremental choice process describes a pattern of staged investment to a strategy where firms minimise downside risk by 1) waiting until a real option is 'in the money' (NPV>0) to exercise the

[2] According to Luerhman (1997) the key to valuing a corporate investment opportunity as an option is the ability to discern a simple correspondence between project characteristics and option characteristics. *"The potential investment to be made corresponds to the options exercise price, the operating assets the company would own assuming the investment was made are like the stock one would own after exercising a call option. The length of time the company can wait before it has to decide is like the call options time to expiration. Uncertainty about the future value of the operating assets is captured by the variance of returns on them; this is analogous to the variance of stock returns for call options."* (p.137) The real option is mapped to a simple option like a European call option. A simple option-pricing model such as Black-Scholes' (1973) model will give the value of the call option.

Figure 2.2: The Option Chain



option, by 2) providing the firm with the inbuilt flexibility to abandon options which are 'out of the money' (NPV<0) and by 3) providing the firm with the ability to revise strategy by exercising a flexibility option.

Bowman and Hurry (1993) also put forth a number of propositions in order to suggest some fundamental insights of option theory. First, they argue that organisations, which hold better-developed bundles of options, fare better during economic upturns and downturns. Second, they contend that organisations should hold options during periods of higher environmental uncertainty and exercise them during stable periods. Third, they claim that it is more valuable to adopt a strategy of making small investments in options followed by large investments to limit downside risks. Fourth, superior performance is attainable if an option is recognised early and exercised when the valued of waiting is at its lowest. Finally, they argue that it is more valuable to hold a portfolio of options than to hold a single option on an asset portfolio. These insights show the value of holding a portfolio of options and adopting an incremental approach to investment until uncertainties regarding the value of the options are resolved. By adopting such a strategy the firm is building on good fortune, and mitigating against bad fortune, and as a result downside risks are minimised.

Luerhman (1998) also viewed strategies as chains of real options. He stated,

> *"Executing a strategy almost always involves making a sequence of major decisions. Some actions are taken immediately, while others are deliberately deferred so that managers can optimize as circumstances evolve. The strategy sets the framework within which future decisions will be made, but at the same time it leaves room for learning from ongoing developments and for discretion to act based on what is learned"* (p.90)

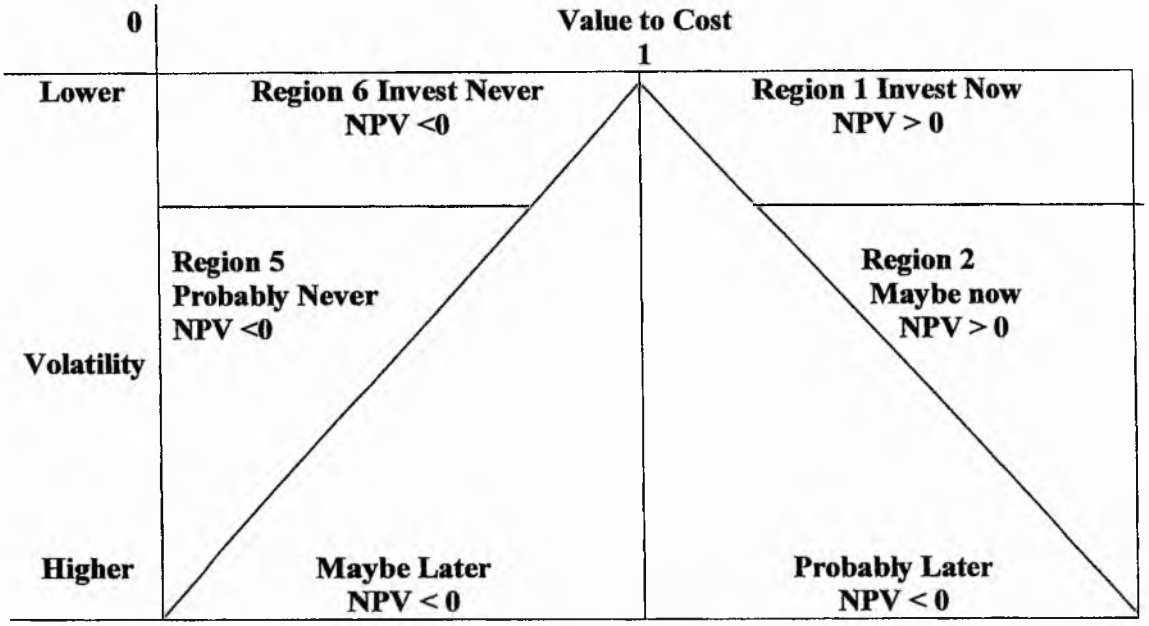
He uses a garden metaphor likening real options to tomatoes, the owner-manager to the gardener and the tomato garden to the firm. He argues that some options should be exercised immediately, analogous to tomatoes ripe for picking, while other options should never be exercised (i.e. rotten tomatoes). In between, there are options or tomatoes, which need to be cultivated before they are ripe. Active managers, or gardeners, Luerhman argues *"are doing more than merely making exercise decisions. They are monitoring the options*

and looking for ways to influence the underlying variables that determine option value and, ultimately outcomes" (p. 90)

Leurhman (1998) locates options in so called option space based on two metrics – value to cost[3], *S/X* and volatility, $\sigma\sqrt{t}$. The value to cost metric is defined as the value of the underlying assets the firm intends to buy, S, divided by the present value of the expenditure $X = \sum_{t=0}^{n}\left[E_t/(1+k)^t\right]$ required to build or buy them, where k is the risk free rate of return, E is the exercise price and t is the time to expiration. Volatility is based on the variance per period asset returns, σ, which depends on how risky or uncertain future returns to assets are and the time to expiration, t, which is based on how long the firm can defer the decision to invest. Using the traditional net present value (NPV) metric and these two metrics, Luerhman (1998) divides option space (or the garden) into six possible areas for action (See Figure 2.3 reproduced from Luerhman, 1998). Options with a value cost metric greater than one, and NPV >0 and low volatility represent ripe tomatoes and should be invested or picked immediately. At the other extreme, options with a value cost metric less than one, and NPV <0 and low volatility represent rotten tomatoes and never should be exercised. In between these two extremes are four other types of options which vary in their attractiveness namely, 'maybe now' (NPV>0, value to cost >1 and volatility =medium), 'probably later' (NPV<0, value to cost >1 and volatility =high), 'maybe later' (NPV<0, value to cost <1 and volatility =high), 'probably never' (NPV<0, value to cost <1 and volatility =medium). Deciding on whether to invest early requires a case-by-case comparison of the value of investing immediately with the value of waiting a bit longer. According to Luerhman (1998), predictable losses in value, by deferring the investment, such as pre-emption by competitors, or a pending change in regulation, may cause the owner-manager to exercise the option earlier than expected. Miller and Folta (2002), Folta and Miller (2002), Arthur (1994), Ingersoll and Ross (1992), Lieberman and Montgomery (1988) and McDonald and Seigel (1986) also highlight the risks of deferring

[3] When the value cost metric is between zero and one, the assets, which the real option refers to, are worth less than its costs. If the value cost metric is greater than one the assets are worth more than the present value of what it costs (see Luerhman, 1998).

Figure 2.3 Option Space



investment (e.g. regulatory changes, network externalities, risk of pre-emption, loss of market share etc.). Further, Luerhman (1998) argues that the owner-manager should actively try to influence the variables underlying the three metrics to 'move' options (e.g. those in the 'probably later' category can be moved into the 'maybe now' category or the 'invest now' category). Price or volume increases, tax savings or lower capital requirements can influence the value cost metric. The volatility of the option can fall over time as uncertainties are resolved. Whereas the passage of time reduces volatility, it also reduces the value cost metric, which the owner-manager needs to counteract through actively cultivating the options.

Luehrman (1998) also describes how chains of options are nested, which is similar to Bowman and Hurry's (1993) view that strategy emerges through the incremental striking of options in a chain.[4] He shows how it is possible to increase the value of early options in a sequential chain by raising the value of later options. The approach of Luerhman (1998)

[4] Miller and Folta (2002) refer to nested options as compound options.

can be likened to one of portfolio management where the owner-manager is constantly striving to improve the value of the portfolio. Luerhman's (1998) approach builds on Bowman and Hurry's (1993) approach by illustrating practically how the portfolio of options can be valued and managed. Unlike Bowman and Hurry (1993) he does not concentrate on the recognition of options.

McGrath (1997), like Luerhman (1998), examines ways in which the firm can improve the value of an option. Specifically, she outlines a number of ways in which the value of a technology positioning option can be altered by the firm making "*amplifying preinvestments*" to reduce uncertainties. McGrath (1997) holds that the firm can act to shape contingencies in its favour, and reduce uncertainty, through making idiosyncratic investments to increase revenue streams or reduce the costs of commercialisation. For example, the firm can attempt to find ways to reduce risks, or costs, to the customer of trying a new product in order to increase the speed of adoption of the new product (e.g free trial samples etc.). This should increase the revenue stream, as a slow speed of adoption reduces the cumulative returns, and consequently the value of the option. Further, a firm can engage in counter blocking strategies to try and gain access to inputs, customers and markets prior to investing in the technology option.

McGrath (1999) likens entrepreneurial initiatives to real options whose value is fundamentally influenced by uncertainty. She argues that the investment made in one real option may pay off by resolving issues surrounding other real options, even if the first was a failure. She states, "*complete accounting of a real option's worth requires an understanding of the other options in play*" (p15). This is in line with Luerhman's (1998) view that options are nested. McGrath (1999) claims that for one to have a more balanced view of entrepreneurial failure, one must value options as part of a bundle, recognising that uncertainty is the key to the value of an option, that failure can have positive consequences, and that preventing failure may mean sacrificing opportunity. She argues that "*the key is not avoiding failure but managing the cost of failure by limiting exposure to the downside while preserving access to attractive opportunities and maximizing gains*" (p.16). According to McGrath (1999), seeking success and avoiding failure can introduce errors in

learning and interpretation processes, making failure more expensive than it need be. She argues that firms should learn from failures.

McGrath (1999), through developing a number of propositions, shows how an options perspective allows more of the possible benefits of failures to be valued and the most egregious of its costs to be contained. Primarily, she argues that entrepreneurs should seek options with higher variance, because this raises the value of real options. She holds that firms should contain the costs of failure by staging investments, particularly investments that are irreversible in nature. Adopting this strategy, plus putting in place appropriate monitoring systems, should increase the bundled value of a portfolio of options. She states, "*By funding sequentially, and then putting in place, mechanisms to spot signals of adverse changes in future value, and adjusting expenditure patterns accordingly, the price of a real entrepreneurial option may be contained*" (p.24). In addition, she contends that firms should hedge their bets and further contain the cost of failure by investing in a number of options rather than a single option. Finally, she holds that entrepreneurial activity will increase in an economy if entrepreneurship is rewarded and if the social cost of failure is reduced.

In general, McGrath (1999) is making similar points to Luerhman (1998) and Bowman and Hurry (1993). She recognises the importance of Bowman and Hurry's (1993) notion of incremental investment to strategy, making small investment initially, before making large investments to contain losses in event of failure or bad news. The importance of investing in a portfolio of real options rather than a single option is also clearly in line with Luehrman's (1998) views. McGrath (1999) did not discuss the active management of the portfolio as earlier in McGrath (1997), but she alluded to the importance of monitoring adverse changes in investments in real options.

Real options logic was developed in financial economics and applied to resource allocation decisions as a way to understand the importance of valuing flexibility in strategic choices under uncertainty. Folta and Miller (2002) applied the logic to equity partnerships, Miller and Folta (2002) to market entry and McGrath and Nerkar (2004) to research and development decisions in the pharmaceutical industry. Developed in the context of large firms, the logic is applied in this thesis to resource allocation decisions or strategic choices

within a small firm context. With fewer resources and capabilities, the small firm may have a smaller portfolio of options available to it in comparison with larger firms. Yet the core principles of real options logic are as relevant to small firms, as they are to large firms. Thus, the examination of real options reasoning in empirical models of small firm flexibility in Chapter 8 is a useful extension of this literature.

2.4.3 Conclusions

This Section has examined the notion of flexibility in the economics literature, tracing its early developments from a means of coping with fluctuations in demand to a means of coping with other forms of uncertainty affecting the choices of the firm. The notion of flexibility, which is most relevant from the perspective of this thesis, is Carlsson's (1989) notion of *strategic flexibility*, that is, how the firm situates itself to avail itself of future opportunities, challenges and new game plans. The firm faces a lot of uncertainty regarding these choices, but can use real options logic to value the strategic flexibility of the portfolio of choices available to the firm.

In short, real options logic holds that firms should seek, and hold, options with higher variance because the potential gains are greater while the cost to access them is the same. The firm should then contain the cost of these options by adopting strategies to minimise downside risk. In other words, the entrepreneur should hold options until uncertainties are resolved and the value of waiting is at its lowest. The entrepreneur should make small investments initially and larger investments when the option matures or materialises. This limits the sunk costs in the event of a withdrawal. The entrepreneur should also monitor signals in its environment, which alter the value of the option. He should also actively try to influence the value of the option where possible by making 'amplifying preinvestments'. By following these guiding principles, the flexibility of the firm is increased. For example, the firm has the ability to revise its strategy based on new information at low cost, building on good news and mitigating against the consequences of bad news.

In uncertain environments, expected profits increase with greater flexibility. The marginal gain in profits is greater, the higher is environmental uncertainty. This thesis examines whether increased flexibility in responding to key organisational change raises

the performance of the firm (see Chapter 8). These key organisational changes are crises or pivotal points in the firm's life, as discussed in Section 2.3. The thesis also examines empirically whether the logic of real options, as described above, adds value in explaining the behaviour of small firms undertaking organisational change in response to precipitators of change or contingency factors (see Chapter 8). Few empirical tests of the logic of real options have been undertaken in a large firm context (e.g. Kogut, 1991; Kim and Kogut, 1996; Folta and Miller, 2002; McGrath and Nerkar, 2004), never mind in a small firm context (e.g. Calcagini and Iacobucci, 1997; Laamanen, 1999). Empirical evidence provided in Chapter 8 attempts to fill this evident gap in extant research, specifically with respect to small firms behaviour. Besides, small firms may experience barriers to change or growth preventing them from exercising real options. The literature on barriers to organisational change is examined in the next Section.

2.5 Barriers to Organisational Change

Smallbone *et al.* (1992, 1995) found that mature small firms, which had been most active in making adjustments, were most successful in terms of growth in real turnover, employment and survival. It was also pointed out in section 2.4.1 that, in the presence of uncertainty, a firm which is more flexible will perform better than an a firm which is less flexible (i.e. The marginal gain in expected profitability is greater the larger the environmental uncertainty). Even though higher performance is associated with firms which are more flexible (or active in making adjustments), it is argued in the literature that there can be restrictions on the rate of expansion. Seminal works by Penrose (1959) and Richardson (1964) argue that firms (both large and small) may sacrifice higher profits for growth. Later studies argued that there were constraints on the growth of the small firm. Notably, Barber *et al.* (1989) in their study of *Barriers to Growth in the Small Firm* summarised the literature on this topic under the headings of management and motivation, resources and market opportunities and structures. More contemporary theories have been put forth by Ghemawat (1991) and Antonelli (1997). Ghemawat (1991) argues that history matters in commitments to a strategy because of causal processes, which, in his

terminology, have features of lockin, lockout, lags and inertia (See Subsection 2.5.3). In a similar vein, Antonelli's (1997) also holds that history matters, in his description of the economics of path dependence. He states, "*Path-dependence defines the set of dynamic processes where small events have long-lasting consequences that economic action at each moment can modify yet only to a limited extent*" (p.643-644). This section begins by examining seminal works on constraints on growth before considering modern views on this issue.

2.5.1 Growth Profitability Trade-off

Early work by Penrose (1959) and Richardson (1964) stressed that the main limitation on a firm's growth rate is a managerial one. Penrose (1959) did not explicitly state that a growth profitability trade-off existed but did highlight that if the firm grew too quickly that "*the efficiency of the firm will suffer*" (p.47). The argument starts with the premise that there is a physical limit to the number of things managers or the management 'team' in a firm can undertake. According to Penrose (1959), "*the capacities of the existing managerial personnel of the firm necessarily set a limit to the expansion of the firm in any given period of time*" (p.45-46). Of course, the firm can hire new management, but these new managers are not substitutes for existing management. Management is seen as a team effort in which individuals collectively coordinate the activities of the firm based on specialised functional skills and team specific skills. The knowledge underlying these specific skills is tacit, and can only be learned through experience and direct instruction from existing managers. Therefore, as the firm expands the existing management needs to not only to recruit, but to train, new managers. The time of existing managers is diverted towards this instructional activity. This reduces the efficiency of the firm. The reduction in efficiency is greater, the more rapidly the firm expands. Thus, there is a growth efficiency trade-off, which is otherwise known as the 'Penrose effect'.

Richardson (1964) extended Penrose's (1959) line of reasoning. In interviews with sixteen businessmen, over three years, he identified four principal constraints on a firm's expansion rate, namely a shortage of labour or physical inputs, a shortage of finance, lack of suitable investment opportunities and lack of sufficient managerial capacity. To evaluate the potential significance of each of these constraints Richardson (1964) asked the

respondents for their views. Richardson (1964) reported, "*A very striking number of guests expressed the view without hesitation that the availability of suitable management had been, and was, the operative check on expansion*" (p.10). Rather than a shortage of good managers, which would lead to rising prices for managerial talent, Richardson found that the chief problem was one of adverse selection. He stated, *"To hire an outsider is to invest in assets of uncertain yield; the rate of new recruitment, at least at higher levels, may therefore be limited by considerations of risk."* (p.11). According to Richardson (1964), existing management or "insiders" were easier to assess than "outsiders". This involved a problem of information asymmetry (viz. adverse selection). He also advanced a similar argument to Penrose (1959) that new managerial recruits services can only be developed through 'on the job' experience. He argued that on taking up a position "*newcomers are at an inevitable disadvantage to established personnel in terms of experience of the firm's products, markets and internal organisation*" (p.11) and that "*their services can be developed fully only after experience of the particular circumstances of their job*" (p.11). Thus, new recruits require instruction. This can take a considerable length of time. As a consequence, Richardson (1964) argued that a growth efficiency trade-off existed. He stated *"there is a functional relationship between the 'organisational efficiency' of a firm and its rate of growth and that the former will decline, after a point as the latter rises*" (p.11)

Richardson (1964) assumed that the strain upon organisational efficiency depended not only on the size of the expansion but also on the direction of expansion. Expansion into new markets was more likely to reduce organisational efficiency than expansion within existing markets. Thus firms, which actively pursue opportunities in new markets, are "*most likely to stress the managerial and organisational restraint on expansion*" (p.12). Rather than narrowly conceiving the managerial function as influencing the costs of production, Richardson (1964) conceived the managerial function as affecting profits. He concludes, "*managerial difficulties, associated with an unduly high rate of growth will show up not just in costs, but in all of the determinants of profitability*" (p.14). The managerial function effects profits, as it is *"part of their [the managers] job to decide upon the precise character of the product, or products, to be made, and to find a market for*

them". The significance of this is that the growth efficiency trade-off outlined above also implies a profitability/growth tradeoff. According to Richardson (1964), "*If an increasing rate of growth causes, after a point, decreasing organizational efficiency then this should show up in profits*" (p.14)

Penrose's (1959) argument was formalised by Slater (1980) who showed that increases in marginal cost would arise from rapidly recruiting managers when the firm is expanding quickly. Weak empirical evidence of a negative relationship between growth and profitability was found by Cubbin and Leech (1986) and Dobson and Gerrard (1989). Cubbin and Leech (1986), for sample of leading British companies from 1951-1977, and Dobson and Gerrard (1989), for firms in the engineering sector in Leeds, found that profits had a negative (though insignificant) influence on growth but that growth had a positive (and insignificant) influence on profits using a two stage least squares estimator (2SLS). Similarly, Cowling (2004) found that growth had a positive influence on profits for a sample of independent unquoted firms over the period 1991-1993. He did not present estimates of the growth equation.

By contrast, Reid (1993, 1995, 1998) found clearer evidence of a growth profitability tradeoff for a sample of small business start-ups using iterated three stage least squares estimates, arguably a superior estimation method (see Davidson and MacKinnon, 1993). The rate of profitability was found to negatively effect growth and the rate of growth was found to negatively effect the rate of profitability. He argued that this trade-off between growth and profitability supported a managerial view of growth. Managers of small businesses push growth beyond that a point, g_1, on the growth profitability possibility frontier, where growth maximizes profits, to a point, g_2, where the firm sacrifices profits for growth. Point g_2 is on the segment of the growth profitability possibility frontier, which has a negative slope, implying a tradeoff between growth and profitability (see Marris, 1964). Reid (1995) argued that managers sacrifice profits for growth when invading new market niches so that they can get a 'toehold' in the market. Reid (1994, 1998) also found evidence that as the firm moves from a simple organisational form of a sole proprietorship to a more complex organisational form found in private companies, it does so, in the short run, at the sacrifice of profits. Increasing tiers of hierarchy, in more complex organisational forms,

were found to limit the firm's growth rate, thus implying a growth efficiency tradeoff. This is a way of explicitly calibrating the notion of organisationally induced costs of growth.

2.5.2 Barriers to Growth in the Small Firm

According to Barber *et al.* (1989), barriers to growth are a more complex issue than simply a lack of finance. They state,

> *"Growth implies much more than the ability to invest in best practice facilities. It requires an ability to adapt and change, to be aware of markets and technological developments arising outside the firm, to make use of internal resources and to combine them effectively and continually with resources drawn from the environment. If these growth barriers are not overcome, then no matter how efficient the firm and how attractive its products it will remain of limited economic significance."* (p.2)

In summarising the various findings of the contributors to the study they describe a number of fundamental barriers to growth ranging from internal factors such as a lack of motivation on the part of owner–managers to external factors such as poor access to skilled labour, finance and technology.

More specifically, Barber *et al.* (1989) hold that a desire of owner-managers to retain control of the key decision-making within the firm limits the firm's ability to grow. The latter requires a formal approach to management with the delegation of responsibilities and decision-making for various functions of the business. With respect to access to finance it is argued that the fundamental barrier is not necessarily the availability of funds for growth, but the availability of funds at a price and conditions on which the borrower and lender agree. With respect to access to skilled labour it is argued that there are two types of shortages. The first being an actual shortage due to the failure of the small firm to recruit and train skilled labour to meet the current or planned activities of the firm. The second is a latent shortage, which exists because the firm avoids hiring skilled staff by employing lower level technologies and growing slowly. Access to external technology is not seen as a barrier to innovation and growth in the small firm. However, the internal capability of the small firm to seek out and make use of the available sources of technologies is seen as a barrier to growth. Barber *et al.* (1989) hold that the existence of barriers, which limit the firms' access to resources, is not necessarily the sole reason for the

lack of growth of the small firms. They argue that the small firm must be willing and able to exploit the available resources.

Other factors which were examined in the account of Barber *et al.* (1989) were the influence centralised purchasing, the impact of merger activity and competition policy and market structure. Centralised purchasing was believed to represent a barrier to the growth of the small firm. The impact of merger activity and competition policy on the growth prospects of the small firm was found to vary with the circumstances of each case. With respect to market structure, the problems faced by the firm were held to be largely internal in terms of the technical skill base, the management systems and processes, the appropriate organisation structures and the availability of skilled managers.

The barriers outlined by Barber *et al.* (1989) represent factors internal and external to the firm, which can constrain the growth of the firm. The next Sub-section, on path dependence, examines how strategic options exercised in the past influence the strategic options, which can be exercised in the future.

2.5.3 Path Dependence

This Sub-section examines factors which cause economic actions to have long-lasting effects. Ghemawat (1991) describes a number of causal processes which cause strategies to persist over time whereas Antonelli (1997) defines path dependence and its underlying determinants. These are described in turn below.

Ghemawat (1991) defines commitment as the tendency for strategies to persist over time. According to Ghemawat, this concept of commitment gains 'concreteness' from the causal processes that it rests on, namely processes that involve lock-in, lock-out, lags and inertia. These processes drive the persistence of strategies within the firm. A firm may be locked into a strategy because of considerable investments made in the past, which were durable, specialised and untradeable in nature. These factors are referred to as 'sticky' by Ghemawat (1991). For example, intangible factors such as relationships and information are untradeable, as opposed to tangible items such as fixed assets. Lock-out, according to Ghemawat (1991), is a mirror image of lock-in. Lock-out stems from opportunities foregone as a result of exercising one particular strategic option rather than another. It refers to the difficulties of reacquiring and deploying investment opportunities or sticky

factors. Both of these factors lead to the persistence of strategies. Strategies also persist over time because it takes time for strategies to be implemented or to unfold (i.e. there are lags involved). Ghemawat (1991) argues that there are *"lags in adjusting the organization's stock of sticky factors to desired levels"* (p.22). Finally, Ghemawat (1991) holds that organisations are also prone to preserve the status quo and thus have an inbuilt bias to inertia, which is part of the culture of the organisation. This also leads to the persistence of strategies over time.

In describing path dependence, Antonelli (1997) defines it as a set of dynamic processes where the consequences of small actions can perpetuate for a long time. Once action is undertaken it is difficult to modify. This is because of what Antonelli (1997) calls *"overlapping irreversibility, indivisibility and the structural action of agents"* (p.634). Irreversibility implies that a difficulty exists in changing a given behavior or choice. Once structural action (intentional or unintentional) is undertaken by the firm, this creates switching costs and sunk costs, which are incurred in revising these strategic actions. Sunk costs are not only present in fixed capital, but also in reputation, research and development activities, marketing outlays etc., and are difficult to replace or utilise in different circumstances. Indivisibility means that an input cannot be scaled down below a certain minimum size, even when the output level is very small. Indivisibilities are a paramount source of economies of scale and scope.

Antonelli (1997) argues that historic time matters as a source of uncertainty about the consequences of each action and because of irreversibility. For example, he states that the sequence of growth stages cannot be reversed and that the time profile of each action has important effects. It affects the selection processes. Even though Antonelli (1997) argues that historic time matters, he notes that 'path dependence is not past-dependence' because it cannot be fully anticipated on the basis of the original events. Path dependence accommodates the consequences of action at each point in time. He states, *"Path-dependence analysis is systemic and dynamic because it focuses attention on the process of change that generated the interaction of a plurality and variety of agents whose behaviour is constrained by the localization of time"* (p.644). He shows how path dependence can

provide a general framework to understand and model the effects of historic time on the behaviour of agents which are able at each point in time to modify their evolution.

Both Ghemawat's (1991) notion of the persistence of strategies and Antonelli's (1997) notion of the long lasting consequences of strategic choices are similar. They both note the significance of irreversibilities in undertaking strategic action or exercising strategic options. Irreversibilities lock a firm into a particular strategy and lock out opportunities foregone. They have long lasting consequences for the firm because they represent factors, which are durable, specialized and untradeable. Long-lived small firms are likely have a large stock of these untradeable factors which lock them into strategies they undertook in the past and lock them out of foregone opportunities. Consequently, these factors may act as barriers to organisational change.

2.5.4 Conclusions

Barriers to organistional change are described in this section as being derived from three sources. First, the expansion of the management team limits the rate of growth, as existing management must instruct new managers. This reduces efficiency leading to an efficiency growth trade-off. Not only does efficiency suffer, according to Richardson (1964), but profits suffer also. Thus there is a growth profitability trade-off where the firm sacrifices profits for greater growth in the short term at least. Evidence of this trade-off was found by Reid (1993, 1995, 1998) within a small firms context. Second, other sources of barriers to growth are highlighted by Barber *et al.* (1989) in their study of barriers to growth in the small firm. They describe constraints on the firm's rate of growth which are internal such as the attitudes and motivation of management and which are external such as access to finance or skilled labour. These limit or slow down the rate of growth in the small firm. Barber *et al.* (1989) do highlight the fact that the owner-manager must be willing and able to overcome these constraints to grow. The third and final argument presents more contemporary theories on the constraints that previous choices place on future choices. In other words, it is argued that because ireversibilities and indivisibilities exist that actions taken have long lasting effects and are difficult to modify. They lock the firm into a pursing a particular strategy and lock the firm out of opportunities foregone. This can act as a barrier to organisational change. This barrier is likely to be considerably

higher for a long-lived small firm than a new entrant assuming that the stock of irreversibilities increases as the firm ages. Elements of these three arguments are used to explain why small firms tend to remain small in Chapter 9. These factors can act as barriers to growth in the size of the small firm. The small firm may also be unwilling to trade-off performance for increases in the size of the firm.

2.6 General Conclusions

This Chapter outlined key theoretical frameworks for examining organisational change and the effect of increased flexibility on the long run performance or survival of the small firm. An interdisciplinary approach was taken relying on contingency theory, stages of growth models and the logic of real options, which were mainly advanced in the management literature. The key elements of the framework are presented in a more unified form below.

Survivors are seen as firms, which realise profits through serving the needs of customers more efficiently than competitors. The realisation of a normal level of profit is the main driver of the decision of the firm to continue trading. Over its life a firm may change in many ways such as its location, its products, its ownership, its legal form but is still seen as the same firm. Once the firm represents a going concern, and has not been liquidated, dissolved or discontinued, it is treated as a survivor. Thus, Chandler's (1977) broader definition of what constitutes a survivor is adopted. This definition has consequences for the identification of survivors in the sample frame of Scottish small firms in Chapter 4.

The determinants of organisational change within the firm were examined from two perspectives. The first perspective viewed the firm as progressing through a number of lifecycle stages as it grew in size and characterised each stage by variables such as the managerial style, the organisational structure, the extent of formal systems, the major strategic goals and the owner's involvement in the business. The second perspective holds that the most effective organisational structure is contingent or dependent on factors in its environment, its task, its size, strategy etc. The relevance of synchronous developmental

pattern proposed by stages of growth models was questioned for the small firms examined in this study. However, these models are useful as they do propose that the firm experiences periods of internal change or upheaval as it grows in size. Growth is seen as an important precipitator of change. Contingency theory is a broader theory of internal change in the organisation, which treats the appropriate organisational form as circumstantial. Support for this theory has also been found in a small firms context (see Reid and Smith 2000b). Organisational change is precipitated by a number of factors other than growth. The organisational form changes in response to changes in contingency factors or precipitators so that there is a close fit between the organisational form and its environment. From this point of view, the small firm is reactive to its environment (or other precipitators of change). Under dynamic contingency theory the firm can actively seek to change the environment (Volberda, 1998). This is not ruled out, but it is generally thought that the small firm has little scope to engage in such acts. This view of organisational change was influential in the design of the survey instrument described in Chapter 4.

Contingency theory suggests that a more flexible, organic, organisational form is most appropriate for the small firm operating in uncertain environments. This Chapter traced the development of the concept of flexibility from a means of coping with demand fluctuations to wider conceptualisations such as Carlson's (1989) notion of strategic or longterm flexibility. The latter conception of flexibility was thought to be most appropriate for examining the flexibility of the small firm in response to pivotal organisational change. This study does not examine flexibility in the sequencing or scheduling of production (operational flexibility) or inherent in the production technology (tactical flexibility) but flexibility which allows the firm to introduce new products quickly and cheaply, to accommodate basic design changes, to change legal form, management style etc. (i.e. strategic flexibility).

Chapter 8 of this thesis sets out to examine whether the flexibility of the small firm, in responding to environmental change, raises the long run prospects of the small firm. Inherent in Stigler's (1939) traditional notion of flexibility is the idea that expected profit will increase with greater flexibility in the presence of demand uncertainty. The more flexible is the firm in such environments, the higher its expected performance. It should be

noted that Stigler's notion of flexibility is closer to Carlson's concept of tactical flexibility. This thesis examines whether strategic flexibility increases the performance of the firm. Thus, it considers whether the increased profit expectation transcends to this long term measure of flexibility

The guiding principles of the logic of real options developed in the management literature as a means of valuing strategic flexibility would suggest that greater strategic flexibility raises the performance of the firm. The firm raises its strategic flexibility by holding portfolios of real options, which have high variance. The entrepreneur is advised to adopt 'a wait and see' strategy, only exercising the options when uncertainties are resolved and the value of waiting is at its lowest. By following this strategy the entrepreneur builds on good fortune and mitigates against bad fortune. The entrepreneur can also minimise downside risk by staging the firm's investment to a particular strategic option, making small investments initially and larger investments when the option matures. In this instance, the entrepreneur reduces sunk costs in the event of abandonment of the option. While this logic was developed in a corporate context its relevance is examined in this thesis for the long-lived small firm. Chapter 8 formally tests the relevance of these guiding principles in a model of the performance of the firm. It examines whether the logic adds value in explaining the behaviour of firms in undertaking organisational change in response to precipitators of change or contingency factors.

The final Section of this Chapter examined barriers to organisational change. Seminal works by Penrose (1959) and Richardson (1964) discuss how difficulties in extending the management team as a result of growth leads to a growth/efficiency or a growth/profitability trade-off. The small firm sacrifices profits for increased growth. Evidence of this trade-off was found by Reid (1993,1995, 1998) within a small firms context. In Chapter 9 rather than examining the growth profitability trade-off an analysis is undertaken of a size performance tradeoff to try and explain the small firms tendency to remain small. Other sources of barriers to growth highlighted by Barber *et al.* (1989) could also be explaining this tendency as well as more modern theories of the constraints that previous choices place on future choices. These constraints are due to irreversibilities and

indivisibilities, which mean that even small actions can have long lasting effects and are difficult to modify.

While this Chapter was conceptual in nature, Chapter 3 considers empirical literature examining factors which foster the growth and survival of the small firm.

CHAPTER 3 FACTORS WHICH FOSTER SURVIVAL: EMPIRICAL EVIDENCE

3.1 Introduction

This Chapter examines theory and evidence on factors, which foster the survival or longevity of small firms. Small firm survival was not examined in a detailed manner in the literature in industrial economics until the nineties, and thus is a relatively new area of study (Audretsch, 1991, 1995). Previously, small firm survival was examined as an auxiliary concern of an extensive literature on the determinants of firm growth, since it was only surviving firms that could grow (Evans 1987a, b; Hall, 1987; Dunne *et al.*, 1989a). Models of firm survival and growth were estimated jointly to overcome issues of selectivity bias in testing Gibrat's Law of Proportionate Effect. Selectivity bias arises from a general tendency of lower growth small firms to cease trading (Mansfield, 1962). More recently, firm survival established an independent position in literature in the writings on the determinants of post entry performance (Audretsch, 1995; Audretsch and Mahmood, 1995, Mata *et al.* 1995; Boeri and Bellman, 1995; Doms *et al.* 1995). The influence of variables, defined at the industry, firm and economy wide level, in explaining variation in firm exit and growth rates of new entrants, are examined in this body of literature.

While the literature on post-entry performance examined factors, which fostered the survival of small firms after entry, the vast majority of the literature concentrated on the formative years of these firms rather than on these firms in the mature stage of their lifecycle. Few studies, with the exception of Smallbone *et al.* (1992, 1995), North *et al.* (1992), Leigh *et al.* (1991) and Lotti and Santeralli (2002), examined the performance of the small firms in their latter years. Lack of data on cohorts of entrants in their latter years is most likely the primary reason for this. There was more data available on firms in their formative years. This study collects data on small firms in the latter years of their life filling this gap in the literature.

The main body of this Chapter has two substantial sections. The first Section examines the extensive literature on the determinants of firm growth, which has received considerable attention in small business economics because of its clear links with job generation, a concern of industrial policy makers. Survival was treated as a side issue in this branch of the literature. The focus of this literature was on the relationship between growth and firm size, or Gibrat's Law. The interpretation of the stochastic models was improved initially with the inclusion of age as an explanatory

variable (see Evans, 1987a, b) and later with other explanatory variables to account for heterogeneities across firms other than size and age (Liu *et al.,* 1999). Econometric developments to cope with problems of sample censoring, heteroskedasticity and the specification of the functional relationship were also undertaken (Hall, 1987, Heshmati, 2001).

The second substantial Section collates evidence from studies on post entry performance. The aim of this Section is to analyse the determinants of firm survival or longevity following entry into a market. Early studies solely used industry explanatory variables to explain post entry growth and survival (Audretsch, 1991). It was not until the mid nineties that firm specific variables were incorporated into models, following evidence from Mata (1994) on the importance of accounting for firm heterogeneities, as well as industry variation. Lack of data at the plant or establishment level was the most likely reason for this. In this Section, the most celebrated factors influencing the survival and growth of the firm are examined. Heterogeneities at the firm (e.g. age, size, ownership status etc.), industry (e.g. economies of scale, technology conditions, growth) and economy level (e.g. unemployment, interest rates) are discussed. Studies are chosen to illustrate the influence of these variables on firm post-entry, growth and survival. After considering these two branches of the literature, some final comments are presented in the conclusion to this Chapter.

3.2 Growth

Much of the literature on the formation and growth of firms has focused on the relationship between growth and firm size, originating in the Law of Proportionate Effect (or Gibrat's Law), which states that growth rates are independent of firm size and its past growth history. All firm growth occurs at the same rate over an interval of time regardless of initial firm size (see Hart and Prais, 1956; Simon and Bonini, 1958; Hymer and Pashigan, 1962; Sutton, 1997, 1998). According to Mansfield (1962), the law states that "*the probability of a given proportional change in size during a specified period is the same for all firms in a given industry – regardless of their size in the beginning of the period*" (p.1030). Such a law generates a lognormal size distribution of firms. This distribution closely resembles distributions of firms observed in practice, with few large firms and many small firms, see Hart (1962).

Three testable hypotheses arose with respect to the law of proportionate effect: (A) that firms of different size classes have the same average growth rate; (B) that the dispersion of growth rates about the common mean is the same for all size classes; and (C) that the rate of growth of the firm in one period should be independent of its growth rate in subsequent periods, (i.e. there should be no serial correlation in the growth rates). Early studies by Simon and Bonini (1958) and Hymer and Pashigian (1962) for the U.S. and Hart and Prais (1956) for the U.K. found evidence in support of Gibrat's Law of proportionate effect. They found no relation between the size of the firm and the mean growth rate (i.e. firm size was independent of firm growth). Simon and Bonini (1958) and Hart and Prais (1956) also found no relationship between the size of the firm and the standard deviation of the firm's growth rates but Hymer and Pashigian (1962) found evidence to the contrary. Thus, even in these tests of Gibrat's Law on sample sizes of larger firms (rather than the complete size distribution of firms) contradictory evidence was evident.

This Section examines further evidence on the appropriateness of Gibrat's Law in the literature, by initially considering early evidence, and then examining evidence in the context of the U.S., and then the U.K., before more recent extensions are examined. Early studies concluded that a sample selection problem existed in testing Gibrat's Law, because of a general tendency for low growth small firms to cease trading (Mansfield, 1962). Later studies for the U.S. and the U.K. set out to correct this problem, and also to improve the interpretation of the models, by including age as an explanatory variable. More recent studies included variables other than age and size to account for heterogeneities across firms. Each of these is examined in turn and a summary of the main studies examined in this survey of the literature is provided in Table 3.1.

3.2.1 Early Studies

Early evidence, which directly investigated Gibrat's Law by looking at firm size and growth over successive years in a panel of firms, cast doubt on the idea that proportional growth rates were independent of firm size. In particular, Mansfield (1962) found that Gibrat's Law did not hold up empirically for the steel, petroleum and rubber tyre industries in the U.S. He held that the law may hold if the issue of censoring firms which exited could be controlled for. Mansfield stated that the law

Table 3.1 Review of studies of Determinants of Firm Growth

Study	Sample Period	Sample frame	Sample Size	Size measure
Hart and Prais (1956)	1885-1950	Firms quoted on London stock exchange	60 –2,103	Market valuation Net assets
Simon and Bonini (1958)	1954-1956	500 largest manufacturing firm in the US	500	Sales
Hymer and Pashigan (1962)	1945-1955	1,000 largest manufacturing firm in the US	1000	Net Assets
Mansfield (1962)	1916-1954 1921-1957 1937-1952	US data on steel, petroleum and rubber tyre industries	- - -	Capacity Capacity Employment
Singh and Whittington (1975)	1948-60	UK companies in Manufacturing, Construction, Distribution and Miscellaneous Services	1955	Net Assets
Hall (1987)	1972-1979 1976-1983	Compustat Publicly traded manufacturing firms in the US	1349 1098 (962 in both)	Employment
Evans (1987a)	1976-82	US Small Business Database, firms in Manufacturing Aged < 7 years 7-20 years 21-45 years > 45 years	 4343 6124 5412 1520	Employment
Evans (1987b)	1976-82	US Small Business Database, firms in Manufacturing Aged < 7 years > 7 years	 9221 24244	Employment
Dunne (1989a)	1967-1977	US Census of Manufacturers (Plant data)	219,754	Employment
FitzRoy and Kraft (1991)	1977-1979	Metalworking Sector in West Germany	51	Sales Employment
Variyam and Kraybill (1992)	5 year period	Manufacturing and Services sectors 25 counties in Georgia < 500 employees	422	Employment

Table 3.1 (continued)

Study	Sample Period	Sample frame	Sample Size	Size measure
Reid (1993)	1985-1988	Scottish Small business enterprises <100 employees	67 39	Net Assets Sales
Dunne and Hughes (1994)	1975-80 1980-85	U.K. Exstat companies Financial and non financial	1172 1696	Net Assets
Hart and Oulton (1996)	1989-93	U.K. OneSource Database, independent companies all industries	29,230 34,774 55,098	Employment Sales Net Assets
McPherson (1996)	-	Data on MSEs in South Africa, Swailand, Lestho, Botswana and Zimbabwe	South Africa (244), Swailand (277), Lestho (599), Botswana (206) and Zimbabwe (345)	Employment
Hart and Oulton (1998)	1986-89 1989-92 1992-95	U.K. OneSource U.K. OneSource U.K. OneSource	8103 8103 8103	Employment Employment Employment
Liu *et al.* (1999)	1990-1994	Taiwan Annual Manufacturing Plant Survey Electronic and electricity industry	915	Employment
Heshmati (2001)	1994-1998	Sweden's Market Manager's Database, Micro and small firms (1-100 employees) Gävleborg region Turnover >1m SEK	7884	Sales Employment Net Assets

failed to hold because "*the probability that a firm will die is certainly not independent of its size*" (p.1031). Smaller firms were more likely to exit. This raises a problem because if small slow growing firms are more likely to fail than large slow growing firms, then an analysis of growth rates by size of firm, based on survivors alone, will be biased towards finding an inverse size growth relationship. Despite the issue of censoring, Mansfield (1962) also rejected Gibrat's Law because "*smaller firms often tend to have higher and more variable growth rates than larger firms.*" (p.1033)

[rejection of hypothesis (B)]. Given this evidence Mansfield (1962) believed that Gibrat's Law was an unreliable base on which to rest theories of the size distribution of firms.

In contrast, Singh and Whittington (1975) found a positive relationship between the rate of growth and size of the firm indicating that larger sized firms grew more rapidly than smaller sized firms for U.K. companies in manufacturing, construction, distribution and services [rejecting hypothesis (A) but in the opposing direction]. This contradicted Mansfield (1962) findings. Singh and Whittington (1975) also found that the dispersion of growth rates declines with an increases in firm size [rejecting hypothesis (B)] and that there was some evidence of persistence in growth rates of firms over the period [rejecting hypothesis (C)]. The latter findings are incompatible with Gibrats Law of proportionate effect in its strongest sense.

Rather than suggesting a positive relationship between growth and size, as found by Singh and Whittington (1975), a number of later empirical studies agreed with Mansfield (1962) and suggested a negative relationship between growth and size indicating that smaller firms have higher and more variable growth rates (Hall, 1987; Evans 1987a,b; Dunne *et al.*, 1989a; Dunne and Hughes, 1994; Hart and Oulton, 1996, 1998). These studies found evidence which failed to corroborate the law of proportionate effect, even after solving for econometric issues, such as the problems of sample censoring, the specification of an appropriate functional relationship and the problem of heteroskedasticity. Given the lack of support for Gibrat's Law and the mechanistic nature of the model, these studies included age as an additional explanatory variable, to test a rival approach based on the writings of Jovanovic (1982).

3.2.2 Studies in United States

Hall (1987) tried to tackle directly such econometric problems, and, in particular, the problem posed by sample selection bias, using a sample of publicly traded manufacturing firms in the U.S. She found an inverse relationship between size and growth even when the growth equation was corrected for sample selection bias, heteroscedasticity and functional specification [rejecting hypothesis (A)]. These econometric problems had no appreciable effect on the results even though size was found to be significantly positively related to survival. However, she did find that Gibrat's Law was closer to holding for large firms than for small firms. In addition,

Hall (1987) included the logarithms of capital and R&D expenditure as additional explanatory variables. She found that expenditure on R&D was a stronger predictor of growth than expenditure on capital, but that these variables did very little to reduce the variance of growth rates. Firms which did no R&D, grew on average about 1-2% more slowly than those that did undertake R&D.

Hall (1987) did not include age as an additional variable, but other studies (Evans 1987a, b; Dunne *et al.,* 1989a) did include age as an additional variable, to improve the economic interpretation of Gibrat's model based on Jovanovic's (1982) lifecycle hypothesis. To explain the discrepancy between the theory of Gibrat's Law of proportionate growth and empirical evidence, Jovanovic (1982) proposed a theory of "noisy" selection. This theory emphasises managerial efficiency and learning by doing as the factors determining a firm's growth dynamics[1]. The general argument is that following entry into a market owner-managers learn about their efficiency (or their true costs) overtime. Efficient firms grow and survive, while inefficient firms decline and fail. Size differences are explained not only by the fixity of capital, but also by the productive efficiency of the firms. Firm growth and survival are linked to the firm's size, age and initial production efficiency, implying that younger firms tend to grow faster than older ones. Based on this approach, the role of age was incorporated into models as an additional variable to capture lifecycle effects in tests of Gibrat's Law. Jovanovic (1982) rejects Gibrat's Law for young firms but suggests that firm growth rates may be independent of size among mature firms; "*growth rates are to be equal among mature firms*" (p.65).

The contribution of U.S. studies by Evans (1987a, b) and Dunne *et al.* (1989a) lay in the data and the inclusion of age and number of plants as additional variables.[2]

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[1] Parkes and Ericson (1998) sought to test the Jovanovic's, (1982) passive learning model in competition with their own active learning model. The test (on Wisconsin State data) suggest that the passive learning model fits the retailing sector well, while manufacturing shows patterns that suggest active learning. According to Caves (1998), the test is skillful and suggestive but also suffers in that passive and active learning are not mutually exclusive: "*opportunities for both could be abundant in one industry and scarce in another*"(p.1957).

[2] Many investigations of Gibrat's Law used Evans (1987b) empirical model given by $S(t')=[G(A(t), S(t))]^{\tau}S(t)e(t)$ where S is firm size, G is a growth function, A is firm age, t is time where $t'>t$, $\tau=t'-t$, and e is a lognormally distributed error term (see Liu *et al*, 1999; Reid, 1993; Variyam and Kraybill, 1992). This equation suggested the following regression framework;

$(\text{Ln } S_{t'} - \text{Ln } S_t)/\tau = \text{Ln } G(A_t, S_t) + u_t$

where u_t is normally distributed with mean zero and independent of A(t) and S(t). The latter was normally estimated using a second order expansion of Ln $G(A_t, S_t)$ yielding

Both databases covered the full range of sizes and ages (see Table 3.1). These studies unraveled the roles played by firm age and firm size as determinants of growth, while also correcting for sample selection, functional form and heteroscedasticity. The studies of Evans (1987a, b) and Dunne *et al.* (1989a) suggested a number of statistical regularities. First, they found that the probability of survival increases with firm (or plant) size. Second, they found that an inverse relationship existed between the proportional rate of growth of a firm (or plant) and firm size, conditional on survival. Third, they found that an inverse relationship between the proportional rate of growth of the firm (or plant) and age for any given size of firm (or plant). Finally, they found that the probability of survival of the firm (or plant) was found to increase with age for any size of firm (or plant). The implication of this is that older and larger firms have lower growth rates but are more likely to survive and vice versa. Thus, these studies rejected Gibrat's Law and supported Jovanovic's (1982) lifecycle hypothesis. In addition, Evans (1987a) rejected Gibrat's Law for mature firms defined as firms older than age 7, 20 or 45. Therefore, he found no evidence supporting Jovanovic's (1982) special case, stating that firm growth is independent of size for mature firms.

3.3.3 Studies in the United Kingdom

Evidence for the U.S. firms found by Hall (1987), Evans (1987a,b) and Dunne *et al.* (1989a) was supported by Reid (1993), Dunne and Hughes (1994) and Hart and Oulton (1996, 1998) using data for U.K. firms. Using data on small business enterprises in Scotland employing less than 100 employees, Reid (1993) found an inverse relationship between firm size and firm growth when size was measured by net assets and by sales. Age was also found to be inversely related to the rate of growth. These findings support Jovanovic's (1982) rival hypothesis. Reid (1993) held that sample selection bias was not a problem for his sample of Scottish small businesses because a large proportion of the firms in the sample survived over the period examined. He found that sample selectivity had no appreciable effect on the results, as the coefficient on the inverse Mills ratio was not significant in estimates of the growth equation. The inverse Mills ratio was obtained from estimates of a probit model of small firm survival.

$\text{Ln } G = \beta_0 + \beta_1 \text{Ln } S + \beta_2 \text{ Ln } A + \beta_3 (\text{Ln } S)^2 + \beta_4 (\text{Ln } A)^2 + \beta_5 (\text{Ln } S)(\text{Ln } A) + u.$

By contrast, Dunne and Hughes (1994) found that smaller firms, which grow more slowly, were more predisposed to exit than larger companies, which grow more slowly, in a sample of quoted and unquoted U.K. companies. They specifically account for sample selection bias by re-estimating their ordinary least squares size-age-growth model within a maximum likelihood sample selection model framework employing a probit analysis of survival by size and age. They show that smaller companies grew faster than larger companies amongst quoted and unquoted UK companies in the period 1975-1985 [rejecting hypothesis (A)].[3] The variance of small companies growth rates was also higher relative to larger companies [rejecting hypothesis (B)]. Despite little persistence being found in growth rates from one period to another [accepting hypothesis (C)], in general Gibrat's Law did not hold for smaller firms. However, there was some support that it did hold for larger firms. They found evidence of threshold effects in net assets, where small firms are adjusting upwards towards some minimum efficient scale of production, whilst firms at, or above, the threshold scale have essentially stochastic growth properties (Davies and Lyons, 1982; Simon and Bonini, 1958).

Dunne and Hughes (1994) also found age to be negatively related to growth, supporting Jovanovic's (1982) model. They argued that age, rather than smallness per se, produced higher variance of growth rates.[4] This result was found to hold in fifteen out of nineteen industries. Young firms are perhaps inexperienced and make more mistakes. Older, and larger, firms have greater stability in growth as these firms have more precise knowledge of their cost structures and efficiency levels, and are consequently less likely to revise their investment plans. Dunne and Hughes's (1994) results are not an artifact of sample selection bias, which is consistent with the findings of U.S. studies. Dunne and Hughes's (1994) examination of death rates shows that smaller firms had the largest death rates but that the smallest, and largest, firms were less subject to takeover.

Hart and Oulton (1996) examine the size and growth of surviving companies in a large database covering over 80,000 independent UK companies. They find that growth was negatively related to initial size for the sample as a whole. This result was

[3] Very small firms were underrepresented in Dunne and Hughes's (1994) sample.
[4] Hart (2000) believed that the influence of age was weakening as firms can travel down the learning curve much quicker given the greater diffusion of knowledge.

found using a Galtonian regression towards the mean for one, two and four years between 1989-93 and measuring size using employment, sales and net assets. However, when the sample was broken down by size group, Hart and Oulton (1996) found that regression towards the mean only occurred for very small firms (i.e. those with eight employees or less). They found no relationship between size and growth for larger size classes. They qualify their findings by stating that the results could be due to transitory factors such as poor reporting of accounting data by small firms, turbulence, failure to account for sample censoring etc. In a further study, Hart and Oulton (1998) in examining 8,103 survivors over three cyclical phases, 1986-89 (boom), 1989-92 (recession) and 1993-1995 (recovery) found that small firms grew faster than larger firms over each cyclical phase. This result held when the data were disaggregated by S.I.C. (Standard Industrial Classification) codes. Younger firms were also found to grow faster than older firms, over each phase studied.

3.3.4 Recent Developments

The empirical literature has undergone a number of developments in recent years. In particular, in specifying the growth equations and survival models researchers have included firm characteristics other than size and age. Examples include ownership structure (Dunne *et. al* 1989a; FitzRoy and Kraft, 1991; Variyam and Kraybill, 1992), R&D, innovative activities or new technology (Hall, 1987; FitzRoy and Kraft, 1991; Doms *et al.* 1995; Liu *et al.* 1999), financial structure (Heshmati, 2001), human capital embodied in the proprietor (Heshmati, 2001; McPherson, 1996; Liu *et. al*, 1999) and export activities (Liu *et. al*, 1999; FitzRoy and Kraft, 1991).

As regards ownership structure Dunne *et al.* (1989a) and Variyam and Kraybill (1992) found that smaller firms that are part of a larger multiple establishment firms have significantly higher growth rates than single establishment firms. On a different vein, FitzRoy and Kraft (1991) found that capital ownership by top management had a positive but insignificant influence on firm growth for a sample of West German metal-working firms. On the other hand, profit sharing by employees had a positive and significant influence on growth. Many researchers have emphasised the role of R&D on firm growth, finding that more innovative firms tend to grow faster (see Hall, 1987). FitzRoy and Kraft (1991) also found that innovation was positively correlated to growth. Doms *et al.* (1995) found that capital intensive plants, employing advanced

technology, have higher growth rates, and are less likely to fail (see section 3.4.2.6 below). Liu *et al.* (1999) found that plants that undertook R&D or imported technology tended to grow faster than those that did not. They found no significant growth differences between exporters and non-exporters, but higher labour productivity was found to increase plant growth. Heshmati (2001) found that indebtedness negatively (positively) affects the growth rates of assets (sales) while it has no impact on employment. Log profitability was found to have a positive impact on sales growth and labour market and human capital variables showed little positive impact on the growth of firms. By contrast, FitzRoy and Kraft (1991) find that the proportion of workers with higher education had a positive and significant effect on firm growth. Furthermore, McPherson (1996) found for a sample of medium sized enterprises in developing countries in Africa that human capital embodied in the entrepreneur had a positive influence on employment growth.

More detailed specifications of survival equations were also developed. Heshmati, (2001) included the debt to equity ratio, a measure of capital intensity, profitability, average length of education, age and the percentage with higher education. In the survival equation, Heshmati (2001) found age to be positively related to the survival probability, but at a decreasing rate. Capital intensity, and share of the population at working age, have negative associations with the survival probability of firms, while degrees of indebtedness, profitability and average length of education are found to have a positive effect on the survival probability. Time effects were also included and were negative indicating a lower survival probability over time compared to the reference period, 1995.

Advances have also taken place in the estimation methods used to test Gibrat's Law. In general, the results of the relationship between growth, size and age relationship were sensitive to the method of estimation adopted. For example, Liu *et al.* (1999) accounted for unobserved heterogeneity among plants other than size, age, capital labour ratios and labour productivity, by estimating a fixed effects model. The plant specific constant term captured the difference in growth processes among plants with the same observed characteristics. The results of this estimation differed from the ordinary least squares estimation, in that the strong impact of R&D and technology imports was no longer statistically significant. The sign on the age regressor changed

from negative to positive. In addition, for micro and small firms in Sweden between 1993 and 1998, Heshmati (2001) found the results of the relationship between growth, size and age of firms was very sensitive with respect to not only the method of estimation (5 methods[5]) but also to the functional form (three different specifications) and the definition of growth and size (whether employment, sales or assets). For example, in the GLS estimation, the relationship between growth and size was found to be negative in the employment model, while it was positive in the sales models. The size effect in the assets model was insignificant. The negative relationship between age and growth of firms predicted by Jovanovic (1982) was found to hold in the employment model, while it was positive in the assets and sales growth models.

3.3.5 Conclusions

From this survey of the literature on firm growth, it is seen that firm survival was treated as a secondary issue. Firm survival was raised as an issue by Mansfield (1962) in tests of Gibrat's Law, as it was found that small, slow growing, firms were more likely to fail than large, slow growing, firms. By implication, an analysis of growth rates, by size of firm, based on survivors alone, would be biased towards finding an inverse size growth relationship. Researchers such as Hall (1987) for the U.S. and Dunne and Hughes (1994) for the U.K. explicitly corrected for sample selection bias, but found that it had no appreciable influence on the results. In general, Gibrat's Law was found not to hold at least for small firms in the U.S. and U.K. Size was found to be inversely related to growth, implying that smaller firms grew by more than larger firms. Age was also found to be inversely related to growth, supporting Jovanovic's (1982) rival hypothesis. Younger firms were more likely to grow faster than older firms. In survival models, age and size were found to be positively related to survival. In recent years, studies have accounted for sources of observed heterogeneities among firms, and also, through advances in estimation techniques, sources of unobserved heterogeneities. In any event, Gibrat's Law was rejected, at least for small firms. There is some rudimentary support that it may hold for large firms (see Hall, 1987; Dunne and Hughes, 1994, Hart and Oulton, 1996). In general, Heshmati (2001) found the results to be sensitive to the estimation method, the functional relationship and the measure of size adopted. Given that Gibrat's model has not been found to hold, Cloughan (1995)

[5] The estimation methods adopted include pooled ordinary least squares, between, within, generalised least squares and a dynamic adjustment model.

called for researchers to build augmented models consistent with facts already generated, rather testing the validity of the law of proportionate effect.

3.3 Post Entry Performance

According to Audretsch and Mata (1995), understanding the post entry performance of firms is important, because it sheds light on the selection process of markets, enabling some firms to survive and grow while others stagnate, and ultimately exit. They state, *" To understand accurately the process by which new firms become established in an industry, as well as the influence they exert upon that industry, it is apparently important to focus on the post-entry performance of firms as well as the process of entry itself"* (p. 415). The literature on post entry performance to date has examined factors which determine the probability of firms exiting from the market for cohorts of new entrants. It examines whether similar factors govern post entry growth. The maturation process of the new entrant is also investigated, to analyse whether, for instance, barriers to survival are weakened, and whether factors which once were barriers to survival, now aid in the promotion of the small firm's survival. Other studies examine whether firm specific variables such as location (Fotopoulus and Louri, 2000a), networks and local environment (Litunen, 2000), use of advanced technologies (Doms *et al.*, 1995) effect small firm survival and/or growth.

It has been found that variables specific to the firm, as well as variables specific to the industry, affect the hazard faced by new entrants and their subsequent growth and performance. Early studies examined solely industry specific factors, because of the lack of availability of longitudinal datasets on cohorts of new entrants (see Audretsch, 1991). Longitudinal databases of cohorts of new entrants were analysed in the mid nineties following evidence from Mata (1994) on the importance of accounting for variation at the industry and firm levels. Mata (1994) rejected the null hypothesis that there were no industry and firm specific effects, using a firm fixed effects model. Mata (1994) argued that failure to take firm specific effects into account could lead to biased estimates of the effect of size on growth rates. Subsequent studies have included firm specific attributes to model producer heterogeneity in hazard and growth models (Mata and Portugal, 1994; Audretsch, 1995; Mata *et al.* 1995). At the firm level, size, ownership status, life cycle stage, location, technology employed and financial structure

are among the most renowned determinants of firm survival. At the industry level, entry barriers affecting industry contestability and technology conditions were found to play a significant role in determining hazard rates. The role played by macroeconomic conditions in facilitating, or obstructing, survival was also examined.

This Section examines the role played by industry specific, firm specific and macroeconomic conditions, in empirical studies examining post entry survival, growth and performance. Where relevant, the Section refers to how the strength of these factors in influencing the survival of the small firm has changed as the firm matures. It begins by examining industry variables in Sub-section 3.3.1, then examines firm specific variables in Sub-section 3.3.2 and finally examines variables capturing the economic cycle in Sub-section 3.3.3.

3.3.1 Industry Effects

This Sub-section analyses the influence of the more celebrated industry variables on post entry growth and performance. Early studies on the survival of small firms solely deployed explanatory variables defined at the industry level, such as industry concentration, industry growth, capital intensity, innovation rate and measures of economies of scale. Greater availability of longitudinal data at industry level (rather than at the plant or firm level) enabled researchers to analyse whether certain industry factors encouraged or others negated the survival of firms. Two main studies concentrated on the effects of industry variables on firm survival, Audretsch (1991), and Audretsch (1995). Both of these hypothesised that variation in the survival across industries was a result of differences in the underlying technological conditions and industry specific characteristics (e.g. the innovation rate, the extent of scale economies, growth). Audretsch (1991) used logit estimation to examine differences in the likelihood of survival, as a result of variation in industry conditions. A limitation of this study is that it could not link the characteristics of establishments or plants to survival or post entry performance. Audretsch (1995) advanced this earlier study by including firm specific variables, namely firm size and a dummy variable for multiplant ownership. Audretsch (1995) focused on systematic variation in post entry growth rates of surviving entrants as well as survival rates, through testing a hypothesis posited by Geroski (1995, p.435) that

> *"the growth and survival prospects of new firms will depend on their ability to learn about the environment and to link changes in their strategy choices to the*

changing configuration of that environment...(t)he more turbulent is the market environment, the more likely it is that firms will fail to cope. If the process of entry continually throws up new aspirants for market places then slow learning coupled with a turbulent environment means that high entry rates will be observed jointly with high failure rates."

In this hypothesis, learning and adaptation to changes in the firm's environment are seen as vital for success, in terms of growth and survival. Opportunities for new firms to innovate influence the ability of the newcomer to survive and grow.

This Sub-section examines the findings of these two studies and also collates evidence from other studies, which included variables defined at the industry level as well as variables controlling for attributes of the firm and the economic cycle (see Mata and Portugal, 1994; Mata *et al.* 1995). The findings are examined under three subheadings namely, scale economies, technological regime and industry growth.

3.3.1.1 Scale Economies

Audretsch (1991) argues that most new entrants are small and tend to operate at a sub-optimal scale of output, at least in capital-intensive industries. Small firms face a larger cost disadvantage in industries where economies of scale play an important role. The larger the minimum efficient scale in the industry, the more difficult it is to attain it, and the less likely is the firm expected to survive. He qualifies this argument by stating that if price exceeds minimum average cost of the most efficient firms in these industries, the probability of newly established firms, which are operating at a suboptimal scale, surviving will be higher. He argues that small firms enter at a sub-optimal scale because they are uncertain about their true ability, which they only learn through operating in the market (Jovanovic, 1982). The greater the cost disadvantage of the firm, the faster it will exit unless it can innovate, or find some other vehicle to grow.

Audretsch (1991) found evidence that the (ten year) survival rate was negatively influenced by the extent of scale economies and capital intensity. Scale economies were measured using the Comanor-Wilson (1967) approach[6] and capital intensity by capital to labour ratios. Higher capital-to-labour ratios were associated with high economies of scale because capital equipment investment is lumpy in nature, and the use of larger machines tends to reduce unit costs, due to increased specialisation or greater utilisation rates. Despite evidence of a negative effect for the ten-year survival rate, Audretsch

[6] Minimum efficient scale is measured as the mean size of the largest plants accounting for one half of the industry value of shipments.

(1991) found that a high minimum efficient scale had a positive influence on survival over the short run (four year survival rate). He argued that this was a function of perhaps elevated price cost margins enabling new and sub-optimal sized firms to survive in the short run. In the long run, a high minimum efficient scale hampers the survival of the firm.

The relationship between economies of scale and survival is complex and perhaps non-linear. Audretsch (1995) found that the conditional likelihood of surviving an additional two years, for entrants that have already survived the first eight years, is unaffected by the extent of scale economies. Scale economies did not exert any influence on the likelihood of survival an additional two years, given that the firm survived in the early years. Such firms had perhaps overcome the barriers to survival; "*[the] effect had dissipated within eight years subsequent to entry*" (p. 454). Thus, Audretsch (1995) found that the determinants of survival are quite different, depending on the length of the period across which survival is measured.

Mata and Portugal (1994) included a measure of minimum efficient scale, and suboptimal scale, in an estimation Cox's proportional hazards model for a sample of Portuguese manufacturing firms. Minimum efficient scale and sub-optimal scale were found to be insignificant. Mata and Portugal (1994) surmised that the variable firm start-up size, which was also included as a regressor in the hazards model, might be already capturing the effect of technological conditions on firm duration.

Audretsch and Mahmood (1995), in estimating Cox's proportional hazard model, found that the coefficient on capital intensity was positive, indicating that the likelihood of survival tends to be lower in industries where economies of scale play an important role. This confirms Audretsch (1991) findings over the long-run and Audretsch (1995) findings for the formative years of trading. Audretsch and Mahmood (1995) do argue that the firm can reduce its exposure to the hazard risk by increasing the start-up size of the firm thereby closing the gap between the firm's start-up size and the minimum efficient scale.

In general, the findings indicate that newcomers in industries where economies of scale play a role face a lower likelihood of survival. This risk can be reduced through entry at a higher start-up size, or if price–cost margins are higher, enabling smaller firms to survive in the short run. The effects of economies of scale are weakened once the

firm has survived the formative years of trading. At this stage, they no longer act as a barrier to survival.

3.3.1.2 Technological regime

The ability of a newcomer to innovate is influenced by what Nelson and Winter (1982) term as the 'underlying technological regime': "*An entrepreneurial regime is one that is favourable to innovative entry and unfavourable to innovative activity by established firms; a routinised regime is one in which conditions are the other way around*" (Winter, 1984 p.297). Gort and Klepper (1982) argued that the relative advantage between newly established firms and incumbent firms depends on the source of information leading to the innovation. If information based on nontransferable experience in the market is an important input in generating innovative activity, then incumbent firms will tend to have the innovative advantage over new firms. This is consistent with Winter's (1984) routinised regime. In this regime, the accumulated stock of non-transferable information is important, as it is not available to firms external to the industry. By contrast, when information outside of the industry is relatively important, newly established firms can have an innovative advantage over incumbent firms. This type of information can be used to gain an innovative advantage in an entrepreneurial regime. Given these characteristics of relative innovative advantage in the both regimes, age plays an important role (see Audretsch, 1991). The longer a firm survives in a routinised regime, the greater the probability of the firm gaining an innovative advantage. The longer the firm operates in an entrepreneurial regime, the lower the probability of the firm gaining an innovative advantage. The hypothesis introduced by Winter (1984) and Gort and Klepper (1982) was that technological and knowledge conditions determine the relative ease with which new firms were able to innovate and therefore survive.

While the concept of the technological regime is difficult to measure accurately, Acs and Audretsch (1987, 1988) found that the existence of the regimes could be inferred from the extent to which small firms are able to innovate in an industry, relative to the total level of innovative activity in that industry. They found that if the small firm innovation rate was high, relative to total innovation, that this reflected an entrepreneurial regime whereas a low small firm innovation rate, relative to total innovation, was more likely to reflect a routinised regime.

Audretsch (1991) found considerable support for the hypothesis that new firm survival is influenced by technological regime for a sample of US manufacturing firms. In logit estimates of the survival equation (ten year survival rate), he found that the small firm innovative rate was positive and significant, holding the total amount of innovative activity constant. A higher ability of the small firms to innovative led to a higher survival rate (in entrepreneurial regimes). The converse is also true: a lower ability of the small firms to innovative, leads to a lower survival rate (a routinised regime). Over a short time frame (four year survival rate) Audretsch (1991) found that technological regime had no significant influence on survival.

In industries where innovative activity of small firms plays an important role, Audretsch (1995) found that the likelihood of new entrants' surviving over a decade is lower than where innovative activity is less important. He found that small firms, which were able to survive, exhibit higher growth rates. At the same time, having survived the first few years, he found entrants, by operating in an innovative industry, actually raise their likelihood of survival. Therefore, the evidence suggests that a highly innovative environment wields a disparate effect on the post-entry performance of new entrants. Those firms which are able to adjust, and offer a viable product experience higher rates of growth and a greater likelihood of survival. However, entrants and certainly new firms that are not able to adjust and produce a viable product are faced with a lower likelihood of survival in highly innovative environments. Audretsch (1995) did find that a highly innovative environment constituted a barrier to survival in the years immediately post entry but that its effect diminishes over time. In fact, Audretsch (1995) found that the conditional likelihood of surviving an additional two years, for entrants that have already survived the first eight years, is actually greater in highly innovative industries. An environment which once constituted a barrier to survival now promotes the survival of the remaining firms and may provide a "*haven of opportunities and a mechanism for compensating for scale and other size related disadvantages*" (Audretsch, 1995, p. 455)

Audretsch and Mahmood (1995) also found that exposure of new establishments to risks tends to be greater in highly innovative environments (i.e. the coefficient on total innovation rate was positive and significant). The coefficient of the small firm innovation rate is negative indicating that higher levels of small firm innovation are

associated with reduced hazard rates. The small firm can try to reduce its exposure to risks in innovative environments by raising its innovation rate. However, the coefficient on the small firm innovation rate was not statistically significant.

In general, it seems that a higher ability of the small firms to innovative leads to a higher survival rate. However, small firms only have an innovative advantage in entrepreneurial regimes. It is more difficult for a small firm to gain a foothold in a market characterised as a routinised regime. Innovative environments constitute a barrier to survival immediately post entry but if the firm survives, this barrier will become a mechanism, which will promote the survival of the firm.

3.3.1.3 Industry growth

In fast growing industries, market penetration can be achieved without causing much harm to competitors, and thus the likelihood that new entrants survive in such environments is higher. Post entry survival is more difficult in mature industries, which tend to be highly concentrated, because the risk of retaliation from incumbent firms, as the newcomer penetrates the market, is higher. On the other hand, it is during the first stages of the industry lifecycle that industries grow faster and that conditions in the industries are more unsettled, leading to the highest turnover rates (Gort and Klepper, 1982). In this stage, firms enter the market by introducing new product innovations. Following the launch of new products, some firms survive and prosper, others fail and leave the market.

Audretsch (1991) and Audretsch and Mahmood (1995) found that industry growth positively influences survival, but its coefficient was not significant. On the other hand, Audretsch (1995) found that industry growth had a significant positive influence on survival and on growth. This effect did not dissipate with time. Audretsch (1995) argued that if industry growth is positive, and unanticipated, that it will result in higher price cost margins, thus facilitating the higher likelihood of survival than would other wise be the case. Elevated price cost margins attract newcomers into the industry, as they tend to compensate for size related cost disadvantages. However, high price cost margins were found by Audretsch and Mahmood (1995) to raise the hazard rate of new entrants in Cox's proportional hazard model. Audretsch and Mahmood (1995) explain this result by referring to fact that industries with elevated price cost margins

tend to be concentrated. In these industries, it is easier for incumbents to detect and punish new entrants thus, lowering the probability of survival.

At the industry level, Mata *et. al.* (1995), in a Cox proportional hazards model, controlled for market dynamics by including the entry rate, the rate of growth and an interaction term between the two as explanatory variables. They found that new plants are more likely to live longer if they entered growing industries, or industries with little entry activity and visa versa. However, they also found that in industries cumulatively characterised by fast growth and high entry rates (captured by the interaction term) the expected duration of plants is shorter. This is consistent with Gort and Klepper (1982) findings.

Mata and Portugal (1994) found industry growth had a negative effect on the hazard rate, implying that firms which enter industries with faster growth rates have a higher likelihood of survival. This effect was found to be significant even after other measures of turbulence were controlled for. Mata and Portugal (1994) included a measure of industry size to capture the relationship between the extent of entry and market size. The coefficient on industry size was negative and significant indicating that a larger industry size lowered the hazard rate. Higher entry was found to raise the hazard rate whereas a higher entrant's size was found to lower the hazard rate. Thus, high entry rates again here reduce the likelihood of survival of the firm.

In general, it was found that new plants are more likely to live longer if they entered growing industries. However if the industries are cumulatively characterised by fast growth and high entry rates (the interaction term) the expected duration of plants is shorter.

3.3.1.4 Conclusions

Economies of scale had a negative effect on the long-run survival of the new entrants, and therefore constituted a barrier to survival, although its effect (in the short run) may be negated because of the presence of high price cost margins. Scale economies have little influence on the continued survival of the surviving firms once they overcame these in the early years of trading. In the later years, they can actually promote the survival of the small firm. At this stage, the probability of surviving is higher in industries characterised by economies of scale than otherwise. New firm survival was also influenced by the technological regime. A higher ability of the small

firm to innovate led to a higher survival rate and visa versa. Thus, newcomers entering industries, which are characterised as entrepreneurial, face a higher likelihood of survival, and a lower hazard rate, than in industries characterised by routinised regimes. Innovative activity is important for the survival of the small firm. Firms which successfully innovate, survive and grow. Firms which fail to innovate successfully, face a higher probability of exit. In general, newcomers who enter fast growing industries, or industries with little entry, have a higher likelihood of survival. When fast growth is combined with high rates of entry, newcomers have a shorter life expectancy.

3.3.2 Firm Effects

In the last ten years, researchers have gained access to a number of longitudinal databases on small firms, which enable them to identify cohorts of entrants and monitor their post-entry performance at the plant level (Mata and Portugal, 1994; Audretsch, 1995; Boeri and Bellman, 1995). This enabled these researchers to identify firm exit, firm growth and alterations in firm specific attributes over time, following entry. The aim of this Sub-section is to recount the influence of firm-specific factors on the growth and survival of the small firm. Through surveying the existing literature on post-entry performance the main firm specific characteristics referred to include size, lifecycle stage, ownership status, location, technology employed and financial structure. Evidence on each of these is provided in turn below.

3.3.2.1 Size

As discussed in Section 3.2, Evans (1987a, b), Hall (1987) and Dunne *et al.* (1989a), using US data, found that the likelihood of survival is positively related to initial size but that growth rates (at least for small or young firms) tend to be negatively related to initial size. Subsequent studies for Canada (Baldwin, 1995), the UK (Dunne and Hughes, 1994), Portugal (Mata and Portugal, 1994; Mata *et al.*, 1995) and Germany (Wagner, 1994) have confirmed that these relationships are not specific to the U.S. Start-up size was empirically established to exert a significant negative effect on the hazard rate and thus, a positive influence on survival, because the larger this size, the less distance is to be covered by newcomers, in approaching an industries minimum efficient size (see Mata and Portugal, 1994). New starts, with a larger initial size, were arguably less handicapped when compared with more cost effective incumbent firms. Furthermore, a larger initial size signalled greater prior expectations of success (see

Mata and Portugal, 1994). Such firms had greater access to finance and more able management.

Mata *et. al.* (1995) argued that current size should be a better predictor of failure than initial size, because it indicates the small firm's current level of efficiency and whether the small firm grew post entry. Firms, which grow post entry are assumed to have better expectations about their efficiency and are assumed to have a lower likelihood of exit in subsequent periods. Their findings indicate that current plant size is an important determinant of the chances of survival. A higher current plant size was found to improve the chances of survival in the estimation of Cox's proportional hazards model, for the sample of Portuguese manufacturing firms. This gives some support to Jovanovic's (1982) model, which emphasises post-entry learning as an important determinant of survival.

Mata *et. al.* (1995) argue that, after taking current size into account, past growth should not matter. In accordance with Jovanovic's (1982) model, current size should be a sufficient statistic for predicting survival at each age. However, they found that after controlling for differences in current size, the coefficient on initial size was still found to be significant, thereby suggesting that past growth matters for survival. Mata *et. al* (1995) explain this result by stating that current size may differ from desired size, whereas in Jovanovic's model both of these variables coincide. Small firms may not be able to adjust instantaneously in response to observed market criteria. A partial adjustment process for firm size in the post entry period is suggested, due to the existence of adjustment costs. The coefficient on initial size was positive, which at first sight is counterintuitive. However, according to Mata *et al.* (1995), this indicates that for firms of a given size, those which started smaller, faced a higher probability of survival. They experienced faster post entry growth.

Agarwal and Audretsch (1999) offer evidence that refines the stylised regularity that "*firm size is correlated with the survival of entrants*" (Geroski, 1995, p.434). Consistent with Jovanovic's (1982) model, they find that, in the formative years, smaller firms have a lower likelihood of survival, but that in the mature stage of the firm's lifecycle, the small firm can overcome size disadvantage, by occupying a market niche. They found no evidence of a positive relationship between size and survival, in the

latter stage of the lifecycle. An important implication of this view is that firms do not necessarily need to grow to survive.

In general, size was found to be positively related to survival and negatively related to growth. The larger the small firm's initial size, the higher its chances of survival. This is particularly true in the formative years of the life of the firm. In the latter years, the small firm can occupy a market niche, thereby protecting itself from size related disadvantage. Current size was also found to a good predictor of survival but initial size was still found to matter, arguably because adjustment costs exist in adapting size to new information about the firm's level of efficiency.

3.3.2.2 Age

Boeri and Bellman (1995) finds that the single most important determinant of exit is age, when they examined the relationship between growth and exit of entering cohorts, and aggregate business fluctuations, for West German manufacturing firms. This evidence is consistent with previous studies in other contexts, which found that exit probabilities were strongly declining with age (see Evans, 1987 a, b; Dunne *et al.* 1989a; Dunne and Hughes, 1994; Heshmati, 2001) and that age was inversely related to growth (Evans 1987a, b; Liu *et. al.*, 1999; Reid, 1993; Dunne *et. al.* 1989a, Variyam and Kraybill, 1992; Dunne and Hughes, 1994). An observation of a clear positive correlation between survival and age is in harmony with learning models of the firm (Jovanovic, 1982; Parkes and Ericsson, 1998) where the firm accumulates basic competitive assets, skills and knowledge about its efficiency over time. Such models predict that the oldest units have a lower probability of exit and grow less than young plants, which is consistent with a large body of empirical literature. Age influences the probability of exit directly from this perspective.

Baldwin and Rafiquzzaman (1995) examine the maturation process of firms that enter an industry by constructing new plants in Canada between 1970-1982. They investigate the extent to which improvements in the performance of an entry cohort are the result of a *selection process,* which weeds out the most inefficient entrants, or a *learning process,* that allows survivors to improve their performance, relative to incumbent firms. According to Baldwin and Rafiquzzaman (1995), the formative years of trading differ from the latter years, because the small firm is playing a game of catch-up (in size, wages, labour productivity and profitability) with incumbent firms. Weaker

firms are being culled over this period. In industries where a new firm's ability to close the gap is important, evolutionary learning[7] plays a significant role, whereas in industries where initial conditions are more important, selection[8] plays a more significant role. Selection was found to dominate evolutionary learning at birth (in labour productivity). The market selects the strongest and most efficient firms (superior products, management etc.). Then survivors grow (through learning) to close the gap with incumbents. Thus both selection and evolutionary learning are found to affect post-entry performance. Selection intensity was found to be more closely related to survival rates, whereas evolutionary learning was found to be related to survivor growth. Together they both affect the entry cohorts post entry growth though in different ways.

The relationship between age and survival is not linear because inter-generational effects were found to have an impact on the lifecycle behaviour of mature small family firms. According to Lotti and Santarelli (2002), small Italian family firms in manufacturing, retailing and the hospitality sector face a higher risk of sudden exit after their thirtieth year (one generation). Thus, as the firm ages (approaches its thirtieth year) the likelihood of exit increases, particularly in the context of small family firms, for which there may be little or no trade-sale market.

Another example of potential sources of non-linearities in the age survival relationship, in newly established businesses, was found by Mahmood (2000) who relied on theoretical arguments from organisational ecologists[9]. He finds support for the 'liability of adolescence' hypothesis, which states that new firm hazards rates follow an inverted U pattern, using a log-logistic model. Organisational ecologists argue that the hazard rate is low for the initial period, as newly founded organisations have a stock of initial resources to help them to survive; the organisation establishes itself during 'adolescence' with these resources. At the end of 'adolescence', when these resources are used up, a final evacuation is made, marked by a hazard maximum. After this point

[7] Evolutionary learning occurs in industries where exit is more or less random, or at least where it is not based on initial efficiency conditions and where substantial progress is made on the part of the surviving entrants in closing the initial gap that entrants have with incumbents (e.g. wage cost, labour productivity, profits etc)

[8] Learning here is essentially accomplished by selection, that is, firms learn about their relative abilities at birth via the selection process, see Jovanovic (1982).

[9] See Stinchcombe (1965) writings on the liability of newness which hypothesised an age dependent decline in organisational death rates.

the hazard rate declines monotonically, and the usual decline in death rates apply as the firm ages. Mahmood (2000) finds that disaggregation of industries matters in his analysis, using U.S. data, and that considerable differences exist in the length of 'adolescence' amongst industries.

Age generally has a positive effect on survival, and a negative effect on growth, indicating that older firms are expected to live longer and grow at a lower rate. Sources of non-linearities have been found in the relationship between survival and age early in the life of the firm, and in the latter years when the owner-manager is retiring from the business. Mahmood (2000) argues that once the start-up capital has been used up in the formative years, the firm faces a maximum hazard, whereas Lotti and Santerelli argues that the firm faces a sudden risk of exit in the thirtieth year of its life, due to intergenerational effects. There is perhaps a similarity in the timing of Mahmood's liability of adolescence, and the intensity of selection noted by Baldwin and Rafiquzzaman (1995). The latter argue that, at birth, the hazard rate is high, because market selection criteria cull out weaker firms. If the firm survives the selection process, then evolutionary learning plays a stronger role, in which the firm plays a game of catch-up with incumbent firms.

3.3.2.3 Financial Structure

Brito and Mello (1995) develop a model examining the relationship between financial constraints, and post entry performance. In this model, firms finance production by using internally generated funds and external loans. There is asymmetric information between those that own, and those that control the assets of the firm and the banks. The banks are uncertain about the small young firm's quality and output price, so external loan finance at this stage in the lifecycle is only available at a higher cost for these firms. As time evolves, the banks learn about the firm, and adjust the terms of the loan contract. As a consequence, firms do not have equal access to credit. Small young firms face greater binding debt constraints than more mature firms with well-known prospects. Credit is perhaps rationed to smaller firms (Calomiris and Hubbard, 1990) due to asymmetric information between lenders and smaller firms (Berger and Udell, 1998). As a result, lenders wish to limit their exposure to perceived riskier projects (see Stiglitz and Weiss, 1981; Petersen and Rajan, 1994).

The existence of liquidity constraints forces firms to start smaller than unconstrained firms (see Holtz-Eakin *et al.*, 1994 for some evidence on this effect). These firms operate at cost disadvantage, because they are short of cash. They are less able to sustain unexpected losses, even for a limited period. Both these reasons make them more likely to die. Among survivors, however, growth is likely to occur. On the one hand, accumulated profits can be used to finance expansion. Furthermore, access to external finance can be improved, because the banks get better signals of the firm's abilities (see Brito and Mello, 1995).

In examining the survival of small business start-ups, Reid (1991) found that gearing had a significant negative effect on small firm survival.[10] This is consistent with Fotopoulus and Lorri's (2000a) findings for Greek firms. A higher level of leverage (defined by the ratio of current and medium to long-term liabilities over total assets) was found to raise the firm's hazard rate. Reid (2003) found that the optimal strategy for highly geared small firms, given that debt is more expensive than equity, is to retire debt early in its lifecycle. Later in the firms lifecycle many forms of capital could be appropriate to the long-run survival of a specific firm, if equity finance is a cheaper source of finance capital. However, in general, for a higher level of external liabilities, a lower level of performance is expected.

There is evidence that owners of small firms have a clear preference for sources of financing that minimise intrusion into their business. According to Lopez-Gracia and Aybar-Arias (2000), financing is based on: firstly, personal savings and resources generated internally; secondly, short or long term debt; and thirdly, least preferred of all, new share issues that dilute control. This corresponds to the pecking order theory of optimal capital financial structure as proposed by Myers (1984). Chittenden *et al.* (1996) also test, and show the relevance of, this theory in a small firm context and highlight the tendency for control aversion in small medium sized enterprises.

In general, small young firms were found to face more binding debt constraints than more mature small firms whose prospects were well known by lenders. This limits the growth of small firms early in their life, and forces them to start smaller than

[10] Heshmati (2001) found that the debt to equity ratio had a positive effect on survival for a sample of micro and small Swedish firms. This contradicts Reid's (1991) findings. Heshmati (2001) found that the debt to equity ratio negatively (positively) affects the growth rate of assets (sales), while it has no impact on employment.

unconstrained firms. Highly geared firms were found to face a greater risk of failure, and, as a result, small firms tend to retire debt early.

3.3.2.4 Ownership

Mata *et al.* (1995) classify a new plant according to the parent company, and the firm's pervious experience in the industry. De novo entrants were split into two categories: single plants; and multiple plants. Plants which were created by already established firms were classified as 'experienced entrants' and 'diversifying entrants'. Experienced entrants were established by parents who were already operating in the industry, whereas diversified entrants were established by a parent who had no activities in the industry. Mata *et al.* (1995) found that de novo entrants (especially single plants) exhibited lower failure rates than experienced entry, and more diversified entry, using a model estimated by Cox's proportional hazards model, for cohorts of Portuguese entrants. Experienced entrants displayed the next lowest failure rates, followed by diversified entrants, which were most likely to close. This did not conform to descriptive evidence for the US, which indicates that de novo entrants experience higher failure rates than diversified entrants (see Dunne *et al.*, 1988). Moreover, using Cox's proportional hazards model, Mata and Portugal (1994) found that multi-plant firms had a lower hazard rate than independent entrants for Portuguese data.

However, Mata *et al.* (1995) had findings which were consistent the findings of Audretsch and Mahmood (1995), and with explanations put forth by Baden–Fuller (1989) and Reynolds (1988) regarding the closure of plants by multi-plant firms. According to Audretsch and Mahmood (1995), the hazard confronting branches of multi-plant firms, subsidiary firms, and firms participating in other firms is higher than that of single–plant entrants. Baden-Fuller (1989) found that multi-plant firms have higher likelihood of closing plants, due to their greater efficiency in re-employing their labour and productive facilities. Reynolds (1988) suggested that multi-plant firms are more likely to close plants because, unlike single unit firms, their remaining plants benefit from the reduction in the number of suppliers.

As regards firm growth, Mata *et al.* (1995) found evidence that the ownership status of new entrants mattered. They found that de novo entrants grew faster than plants created by established firms and that diversified entrants experienced the lowest post entry growth. The latter were found to stay the same size as they were at start-up.

Mata *et al.* (1995) argue that de novo entrants are expected to grow faster than plants created by established firms, because they start smaller at birth (due to cash constraints or uncertainty about the firms efficiency) and thus should receive larger marginal benefits from learning. These findings contrast with those of Dunne *et al.* (1989b), which report that among survivors in each cohort, new plants operated by previously established firms grew considerably faster than de novo entrants. Dunne *et al.* (1989a) found that the expected growth rate declines with size for single plant firms but increases with size for plants owned by multi-plant firms.

Here, there is conflicting evidence on the effect of ownership structure on the hazard rate, and on growth rates between earlier studies by Dunne *et al.* (1988, 1989a, b) and Mata and Portugal (1994), and later studies by Mata *et al.* (1995) and Audretsch and Mahmood (1995). Later studies hold that independent firms face a lower hazard rate, and grow faster, in comparison with multi-plant firms, whereas the opposite was found in earlier studies.

3.3.2.5 Location

According to Smallbone *et al.* (1993) and Storey (1994), there is a strong correlation between a firm's location and its growth. Storey (1994) found that firms located in urban and remote rural areas of the United Kingdom are likely to grow least rapidly than firms located in more accessible rural areas. However, Storey (1994) also found that geographical areas with high rates of new firm formation are also those with the highest death rates. According to Storey and Wynarczky (1996), the buoyancy of the locality is of great significance in explaining the survival or non-survival of young firms. Fotopoulos and Louri (2000a) introduce a spatial dimension to the analysis of firm survival, by examining whether the hazard facing new firms is significantly different, between major hubs and non-metropolitan areas. Fotopoulos and Louri (2000a) found that the location of Greek manufacturing firms in the capital (Athens), versus the rest of the country, affects survival positively, especially where smaller firms are concerned. In large metropolitan areas, the firms are close to suppliers, customers and skilled labour. In contrast, Littunen (2000) found that location did not influence the survival of the small firm in the early years of trading, for a sample of Finnish firms.

Overall, the evidence for location is mixed. In the U.K., firms located in a buoyant locality, or accessible rural areas, experience the highest growth rates. In other

European countries, a firm's location either had no effect, or firms located in major hubs had a higher rate of survival.

3.3.2.6 Technology Employed

Doms *et. al.* (1995) extend the empirical literature on plant growth and failure, by controlling for producer heterogeneities, arising from differences in the level, and type, of capital equipment used in the plant. They argued that capital usage was likely to have independent effects on the growth, and failure, of plants because of its fixed and sunk nature. They also argued that the use of advanced manufacturing technologies may directly increase plant productivity, and thus the likelihood of survival, and may be a proxy for unobserved managerial ability. Doms *et. al.* (1995) control for variation in capital labour ratios, and differences in the number of advanced technologies (e.g. robotics, lasers, computer controlled equipment), in estimations of exit probabilities and post entry growth equations, for a sample of US manufacturing plants. The influence of the number of advanced manufacturing technologies used, rather than the intensity of usage, is examined. They find that capital-intensive plants, and plants employing advanced technology, have higher growth rates, and are less likely to fail. The effects are present after controlling for plant productivity and age. However, the measure of use of advanced manufacturing technologies is sensitive to the inclusion of size variables, particularly in the estimation of exit probabilities. When these variables are included in the exit equation, the influence of advanced manufacturing technologies employed on exit probabilities is severely weakened. Doms *et al.* (1995) argue that this is not surprising, given that technology usage is strongly positively correlated with size. In the estimation of plant growth equation, technology usage measures had a larger positive effect on growth when plant size was controlled for indicating a potentially important role for the nature of capital equipment in the growth process. Small US manufacturing plants were underrepresented in this study, thus the applicability of the results across the complete size distribution is unknown. Overall, plants employing advanced technologies were found to have higher growth rates, and to be less likely to fail, after differences in size, age and productivity were controlled for.

3.3.2.7 Conclusions

Having examined the effect of the more celebrated firm specific factors which influence the survival and growth of the firm, this Sub-section summarises the

influences of these factors on post entry performance. In general, firm size and age were positively related to firm survival, but negatively related to firm growth. However, nonlinearities were found to exist between age and the probability of exit, due to the liability of adolescence and the sudden risk of exit, once family firms reached their thirtieth year of operation. Diversified and experienced forms of entrants were found to be more likely to exit than de novo entrants. De novo entrants were also found to grow more quickly than other forms of entrants. This evidence however was not conclusive as it was found in some studies that multiplant firms have a lower hazard rate than single plant entrants (Dunne *et al.*, 1988, 1989a, b; Mata and Portugal, 1994). Firms have greater access to finance as they age. However, liquidity constraints, due to credit rationing early in the lifecycle of the firm, may negatively impact upon the survival and growth of young small firms. Plants employing advanced technologies were found to have higher growth rates and to be less likely to fail. The effect of location was inconclusive. Evidence was mixed on the favourableness of urban and rural environments.

3.3.3 Economy

The effect of wider economic conditions on new firm survival has been dealt with in just a few papers. Audretsch and Mahmood (1995) explicitly include variables such as the rate of unemployment and the real interest rate, which capture macroeconomic conditions. The rate of unemployment and the real rate of interest capture the link between the business cycle and exposure to risk of failure. These variables were expected to elevate the hazard rate. Audretsch and Mahmood (1995) provide evidence that the hazard rate for new establishment is higher in downturns, as indicated by higher unemployment rates. A rather counterintuitive result in this study is the negative effect of interest rates on the hazard confronted by new firms. The explanation provided is that most firms in the US are not crucially dependent on external capital. Other explanations of this result were the length of the database. Five time periods may not have been sufficient to disentangle complicated links between the macroeconomic and the microeconomic environment at the level of plant establishment. Multicollinearity between the macroeceonomic growth rate and the real rate of interest may also have resulted in this counter intuitive finding.

Fotopoulos and Louri (2000a) also found evidence of the sensitivity of the hazard confronting new firms to the economic cycle. The evidence provided demonstrates that Greek firms established closer to economic downturns have an increased exposure to failure, probably because of the adverse market conditions that less experienced firms are faced with. However, while Audretsch and Mahmood (1995) and Fotopoulos and Louri (2000a) found that the economic cycle affected the hazard rate Boeri and Bellman (1995) on the other hand suggest that exit (aggregate hazard) in German manufacturing is not responsive to the economic cycle. Boeri and Bellmann (1995) examined the relationship between growth and exit rates on the one hand, and aggregate business fluctuations on the other, for a sample of West German plants. The period covered by the data was characterised by two cyclical peaks (1979 and 1990-1991) and one cyclical trough (1982-1992). According to Beori and Bellmann (1995), the finding that exit is not responsive to the cycle is at odds with views of recessions as times of cleansing, where creative destruction processes occur. They found that the number of jobs generated at start-up was lower for a cohort established during an economic downturn, than a cohort established in favourable economic conditions, but the employment performance of various cohorts after entry is not. However, in estimating the hazard function, the dynamics of aggregate unemployment was either not significant in affecting the exit probability, or entered the equation with the wrong sign. Hazard rates were procyclical (rather than increasing) during downturns, and decreasing during upturns. Two explanations were provided for this counter intuitive result: 1) High correlation between entry and exit rates may mean that firms in older cohorts are displaced by competition from newcomers; and 2) Heterogeneity in the performance of various industries with regard to economic cycles (e.g. some sectors may expand during economic downturns and visa versa).

The growth of survivors also displayed little cyclical sensitivity, but tends to become more responsive to aggregate business fluctuations as the cohorts of West German firms age (Boeri and Bellman, 1995). As plants get older, their performance is more and more influenced by aggregate business fluctuations. Older plants are more likely to shrink in response to exogenous shocks, as they are larger than new entrants, which are more likely to exit. This would render older firms more sensitive to the economic cycle. Boeri and Bellman (1995) put forward two further explanations for the

role played by age on the post entry performance: 1) The product specialisation of young with respect to older units implies that new entrants tend to occupy market niches and gradually expand their market specialisation. In market niches, younger firms are more protected from exogenous shocks, whereas older expanded units may be more affected by cyclical conditions; and 2) Cost asymmetries between young and old firms, as a result of technological indivisibilities and irreversible investment in physical capital, arguably impose capacity constraints on young units. As a consequence, young units may not be in a position to expand production, in response to positive demand shocks. Older firms should have instead accumulated more physical capital over time, and may be operating below capacity when the shock occurs. They can therefore accommodate output expansion by adjusting their labour input only.

In general, there is some evidence to support the inclusion of variables, which measure the economic cycle in models of firm survival and post entry growth. Evidence was mixed on the sensitivity of hazard rates to the economic cycle. On the other hand, growth rates of young surviving firms were found to be insensitive to the economic cycle, whereas those of older firms were found to be sensitive to the cycle. In other words, sensitivity to the economic cycle was found to grow stronger as firms aged.

3.3.4 Conclusions

This Section sheds light on the post entry performance of firms. It explicitly examined the influence of variables defined at the industry, firm and economy level on the survival of the firm. The effect of these variables on post entry growth was also examined. Variables specific to the firm, industry and the economy were found to influence firm survival and growth. Broadly speaking, factors which fostered the survival of the firm at the industry level included industry growth and entry into entrepreneurial regimes, and, at the firm level, included age, size and use of advanced technologies. Factors which raised the probability of exit included, at the industry level, economies of scale and entry into routinised regimes; and at the firm level included credit rationing; and finally at the economy level included high unemployment. The influence of factors such as ownership structure and location were inconclusive. The negative effect of barriers to survival, such as economies of scale and credit rationing, weakens as the firm matures. Also, as the firm gets older, its rate of growth becomes

more responsive to the economic cycle. It also faces a greater hazard risk as the firm approaches its thirtieth birthday.

The studies undertaken are comprehensive in that they account for heterogeneities defined at the firm, industry and economy level. However, the vast majority of these studies concentrate on factors which foster the survival of firms immediately post entry rather than on these firms in the mature stage of their lifecycle. There is a lack of data on long-lived small firms. This study gathered data on small firms in the latter years of their life to fill this evident gap in the literature. Existing hypotheses are challenged, using new data on long-lived small firms. Variables defined at the industry, firm and economy levels discussed above feed into the design of the survey instrumentation in Chapter 4. They were useful in identifying factors which aid the firm's survival over the long haul (e.g. for the development of the long run performance indicator). To a lesser degree, they were useful in identifying precipitating influences of change and consequential adjustments.

3.4 General Conclusions

This Chapter examined evidence on factors which fostered the survival of small firms. In this regard, it considered two substantial branches of the literature. The first discussed the determinants of firm growth. The second discussed post entry performance. In the literature on the determinants of firm growth, survival was treated as a secondary issue. The problem of censorship increased the likelihood of finding an inverse relationship between growth and firm size, because small slow growing firms were more likely to fail than large slow growing firms. Models of firm survival and firm growth were estimated jointly, to overcome this issue of selectivity bias. It was not until the nineties that firm survival was examined in its own right, to shed light on the post entry performance of small firms. Initially, the effect of industry variables on firm exit and firm growth were examined, before sources of observed firm specific and economy wide variables were considered. This survey of the literature identified a number of factors at the firm, industry and economy level which fostered the survival of the firm. Relevant changes in these factors, as the firm matured, were also examined.

This thesis extends this literature in a number of ways. First data are gathered on mature small firms. These firms are older than those examined in the vast majority of

studies considered in this survey of the literature, and thus they allow existing hypotheses to be challenged using this new data. Chapter 4 outlines features of the design of the survey instrumentation used for this study and presents the fieldwork methods adopted in gathering data on these long-lived small firms. Second, Chapter 5 estimates models inspired by Gibrat's Law over the life of the firm to resolve conflicting empirical evidence in support for this law outlined in Section 3.2. In addition, the measures gathered as part of the survey are related to firm growth and performance, in an exploratory data analysis presented in Chapters 5, 6 and 7. The post entry performance of these firms is examined over a longer period (over 25 years on average). As the data available on non-survivors is limited, these Chapters are chiefly examining the post entry performance of the long-lived surviving firms. Fourth, Chapter 8 investigates whether small firm flexibility raises the performance of the firm, using a Heckman sample selection model (Lee 1982, 1983; Heckman, 1976, 1979; Davidson and MacKinnon, 1993). Therefore, in this regard, it estimates a simple survival equation, examining factors which influence survival over an average of twenty-five years. Chapter 9 also examines a performance equation in a simultaneous equation system, which sheds light on endogeneities between long run performance, size and other attributes of the small surviving firms, such as market extent and competitive strategy. The cases profiles presented in Volume II, Appendix 5 also characterize the long-lived-small firms in the sample. They present qualitative evidence on the post entry performance of these firms. They illustrate how the small firm developed post entry to become a long-lived small firm.

CHAPTER 4 FIELDWORK

4.1 Introduction

The aim of this Chapter is threefold. First, this Chapter sets out to analyse the composition of the sample frame of long-lived small firms. This is followed by a discussion of the design of the survey instrument used in fieldwork and finally, the fieldwork methods adopted in this study are outlined. The contribution of each of these core elements is conveyed, briefly, before each element is examined comprehensively in the main body of this Chapter.

As explained in Chapter 1, a sample frame of 90 long-lived small firms was extracted from three "parent" samples of Scottish small business enterprises, namely Leverhulme (1985-1988), Telephone Survey (1991) and Leverhulme (1994-1997), for exposition purposes (see Table 1.1). Prof. Gavin Reid and co-researchers (Dr. Lowell Jacobsen, Dr. Margo Andersen and Dr. Julia Smith) interviewed the owner-managers of these small firms in the 1980s and 1990s. In this thesis, we recognise the value of re-interviewing these firms after an extended period of time. The process of identification of the sample frame of ninety surviving small firms from the three parent samples is discussed in Section 4.2. The composition and representativeness of this sample frame are also explored. Identifying long-lived small firms from known sources, as undertaken here, ensures that data is available on non-survivors, which is useful in correcting performance estimates for sample selectivity bias (see Chapter 8).

A novel survey instrument was designed comprising of 5 sections[1]. Questions were constructed to extract information on the characteristics of the mature small firm, changes in the scale and scope of its operations, pivotal changes in the running of the firm, factors which fostered the survival of the firm and the level of innovativeness and the technological progressiveness of the firm. Two unique features of the design include: 1) an innovative way of calibrating organisational change; and 2) a multidimensional scale on which owner-managers self appraise the influence of items on the long run prospects of the firm. New measures of firm flexibility (see Chapter 8) and performance (see Chapter 6) are developed using the variables derived from these attributes of the instrument design. Section 4.3 provides a comprehensive explanation of the design of the survey instrument. Some amplification is also provided on the

[1] Enterprise Ireland generously funded the survey on which this research is based under the International Collaboration Programme 2001 to 2002.

usefulness of new measures in testing hypotheses. A copy of the survey instrument is presented in Volume II, Appendix 1.

The survey instrument was used to collect data in face-to-face interviews with owner-managers of long-lived small firms. Data on the measures included in the survey instrument have not been gathered previously for a sample of long-lived small firms, or in some instances, for any sample of firms. The quality of fieldwork methods applied is explored in Section 4.4. The survey instrument was carefully piloted. Data were collected in face-to-face interviews with owner-managers rather than through telephone interviews to improve response rates and the value of the data. The data were coded, entered into SPSS[2] and cleaned prior to inferential analysis. A database was designed to ensure flexible analysis of both quantitative and qualitative data. A detailed data dictionary is provided in Volume II, Appendix 4.

The unique design of the survey instrument, and the data gathered using this instrument, is an important contribution of this study. Detailed data, of this nature, has not been gathered previously on long-lived small firms. It enables an in-depth analysis, of the characteristics of the mature small firm, and of the factors which influence their performance.

4.2 Sample Design

Long-lived small firms are defined in Section 1.1 as firms which were classified as small firms at inception, that have been trading for more than 10 years and still continue to trade. Similar definitions of maturity have been adopted by Smallbone *et al.* (1992,1995). Changes in the ownership, scale, principal activities and management of small firms do not alter this definition (or selection criterion). As discussed in Section 2.2, firms can undergo a number of organisational changes and still be viewed as the same firm (i.e. the activities of the firm perpetuate). Firm death constitutes the discontinued existence of the small firm.

Long-lived small firms were identified for inclusion in the sample frame from three 'parent' samples of Scottish small business enterprises, Leverhulme (1985-1988), Telephone Survey (1991) and Leverhulme (1994-1997). The firm survival rates were found to be relatively low in two of the three parent samples [i.e. in Leverhulme (1985-

[2] SPSS is an acronym for Statistical Package for the Social Scientist.

1988) and the Telephone Survey (1991) samples]. Therefore, to obtain a larger sample of long-lived small firms for analysis, surviving firms from three parent samples needed to be combined (see Table 1.1 or Table 4.1 below). As Prof. Reid and his co-workers contacted the firms in the three parent samples previously, they provided a convenient set of known sources upon which further fieldwork could be built. In total, there were 396 firms[3] in the three parent samples combined. However, only 219 met the necessary criteria for selection (i.e. age >10 years). Eighty-six firms from the Leverhulme (1985-1988) sample, one hundred and thirteen from the Telephone Survey (1991) and twenty firms from the Leverhulme (1994-1997) sample were extracted (see Table 4.1).

Long-lived small firms (or the surviving firms), which were at least ten years old, were identified from the sample frame of 219 firms. These firms were traced through searching through the Yellow Pages. The search engine at http://www.yell.co.uk was used to trace firms of the same, or similar name, operating from the same premises, or in the same region (as when they were contacted previously by Prof. Reid). Using this mechanism, firms of the same name and operating from the same business premises were identified immediately. A quick telephone call was necessary to establish that a firm of the same name, but which had altered its location, was in fact the same firm. It was more difficult to identify survivors when the name of the business was changed. It is likely that the name of a business could be modified following changes in ownership of that business. In this instance, firms with similar names, or those that perform similar activities, in the same location, were contacted by telephone to confirm whether they were currently, or previously, owned or managed by the original owner-manager. The owner-manager of a competitor was generally able to confirm if a firm had ceased to trade, or if it had been sold and was currently trading under a new name. A small firm was classified as a non-survivor if all efforts to contact the owner-manager of the business were exhausted without success. This occurred when a similar firm (with the same name or different name) could not be found operating either in the same premises or in the surrounding region.

[3] This comprised of 86 firms in the Leverhulme (1985-1988) sample, 160 firms in the Telephone (1991) sample and 150 firms in the Leverhulme (1994-1997) sample.

Table 4.1: Description of the Parent Samples

Parent Sample	Phase	Dates	Method	Number of Cases	Extracted			Survivors	
					Survivors	Non-survivors	Total	Non-response	Interviewed
Leverhulme (1985-1988)	**Phase 1:**	Participant Observation (December 1983 to July 1984)	Qualitative Unstructured Fieldwork	-	25	61	86	5	20
		Administered Questionnaire: (April to October 1985)	Field Structured Interview	**86**					
		Semi-Structured Interview: (July to October 1985)	Field Interview Agenda	***Sub-Sample 17***					
	Phase 2:	Administered Questionnaire: (July to September 1998)	Field Structured Interview	***Survivors* 47**					
Telephone Survey (1991)	**Cross-sectional**	Administered Questionnaire: (1991)	Telephone Survey	**160**	**50**	**63**	**113**	**20**	**30**
Leverhulme (1994-1997)	**Longitudinal**	Administered Questionnaire: (Annual basis from 1994 – 1997)	Field Structured Interview	**150**	**15**	**5**	**20**	**2**	**13**
Total				**396**	**90**	**129**	**219**	**27**	**63**

A summary of the fieldwork methods adopted, the numbers of cases in, and the numbers of traced survivors from, the three parent samples are presented in summary form in Table 4.1. The information conveyed in this table is described further in Section 4.2.1 below. Subsection 4.2.2 examines the representativeness of the three parent samples. This has consequences for the representativeness of the sample frame of long-lived surviving firms. Initially, the advantages offered by an approach, which extracts long-lived small firms from known parent samples of Scottish small business enterprises, are considered.

Extracting the long-lived small firms from known sources was found to be a superior approach to that offered by the use of independent sources, such as Dun and Bradstreet for two reasons. Firstly, by proceeding in this way, data are available on non-survivors, which would not be the case if a sample of firms were obtained from Dun and Bradstreet. Data on non-survivors and survivors allow the strategies adopted by non-survivors to be compared to those adopted by survivors which is useful in highlighting differences between these two groups. An analysis of differences between survivors and non-survivors is only undertaken in a small way in this thesis, but could be a fruitful source for future comparative research. Secondly and importantly, this approach allows estimates of long run performance relationships to be corrected for sample selection bias. Such a correction was undertaken in the econometric estimation of the relationship between measures of flexibility, firm-specific turbulence and performance in Chapter 8, using Heckman's sample selection estimation method.

4.2.1 The Parent Samples

The three parent samples, from which the sample frame of ninety surviving firms (or long-lived small firms) was extracted, are described in a brief manner below. The reader is referred to earlier works by Prof. Reid and his co-workers. Survival rates in the three parent sample are considered, as well as the type and nature of the data gathered from each. This has consequences for the type of data which are available for the Heckman sample selection estimation in Chapter 8. As it happens, only a few measures are common across the three parent samples. Examples include variables such as age, sector, employee size and turnover. Variables such as number of product groups and gearing are common to two of the three parent samples [i.e. the Leverhulme

(1985-1988) and Leverhulme (1994-1997) parent samples]. Few common measures exist between the three parent samples, because as outlined below, data gathered on the Telephone Survey (1991) parent sample was different in nature, and narrower in scope, to that gathered on the other two parent samples. Let us proceed with a short description of the three parent samples.

4.2.1.1 Leverhulme (1985-1988)

The fieldwork for Leverhulme (1985-1988) gathered data, both quantitative and qualitative, via face-to-face interviews with the owner-managers of 86 new business starts in two phases. This sample was chosen by field contacts, normally Directors of Enterprise Trusts, from a typical sample of their caseloads (see Reid, 1993). Quantitative data was collected on firm characteristics, pricing, costs, competition and finance in the first phase of data collection. Qualitative data were also collected on the competitive forces facing the firm, the firm's competitive strategy and the firm's defensive strategy in this phase for a sub-sample of 17 firms. In phase two, survivors were re-interviewed. Information was gathered on profitability, size, changes in competitiveness, changes in product line, gearing, skill shortages and owner-manager opinions on Scotland's enterprise culture. A detailed description of this parent sample, the instrumentation and fieldwork methods adopted is provided by Jacobsen (1986), Reid *et al.* (1993) and Reid (1993). Of the 86 firms in this sample, 25 (29%) survived and 20 of these agreed to be re-interviewed for this study.

4.2.1.2 Telephone Survey (1991)

This second sampling frame comprised of 160 mature small firms that were members of the Federation of Small Business, in Scotland. The firms were interviewed by telephone in 1991. At that time, 113 firms agreed to be interviewed. The survey instrument gathered data on financial aspects of the mature small firms, including funding shortages, forms of external finance, relations with banks and perceptions of the venture capital market. Thus, the scope of the instrumentation for this study was comparatively, narrowly focused. The composition of this sample was examined in Reid and Andersen (1992) and Reid (1996). Fifty, out of the 113 firms in this parent sample, were still in business in 2001 (a survival rate of 44%). Thirty of these firms agreed to be re-interviewed.

4.2.1.3 Leverhulme (1994-1997)

From Leverhulme (1994-1997), the third parent sample of 150 firms, 20 long-lived small firms aged 10 years or more, were identified. The owner-managers of these new business starts were interviewed annually in a face-to-face manner between 1994 and 1997. The instrument gathered data on the finance, costs, business strategy, human capital, internal organisation and technological progressiveness of the businesses (see Reid 2003; Reid and Smith, 2000a; Reid, 1999; Smith, 1997a; and Smith, 1998). Fifteen out of twenty firms, aged 10 years or more, were still trading (a survival rate of 75%). Thirteen of these agreed to be re-interviewed.

4.2.2 The Representatives of the Sample Frame of Long-lived Small firms

The primary objective of this Sub-section is to examine the representativeness of the sample frame of long-lived small firms, which were extracted from the three parent samples. In this regard, the sectoral composition and geographic distribution of the extracted sample is compared, where appropriate, with that of the population of small firms in Scotland and in the U.K. Survival rates within sectors, and geographic regions, are also examined. In a brief way, differences in the age and scale of long-lived survivors and non-survivors (at the initial interview) by parent sample are highlighted. The latter provides greater insights on the differences in the characteristics of extracted survivors and non-survivors across the three parent samples.

4.2.2.1 Sectoral Composition

Table 4.2 presents detailed information on the sectoral composition of the sample frame (N_T=219) and the sub-sample of long-lived small firms (N_s=90) (where N is the number of firms extracted). It also provides comparative figures, for Scotland and the U.K. as a whole, in order to assess the sectoral representativeness of the sample of long-lived small firms. Survival rates within sectors are also calculated. In assessing the sectoral representativeness of the sample of long-lived small firms, the percentage of firms operating in manufacturing (SIC 01-60) and services (SIC 61-99) sectors are examined initially.[4] Then, the representativeness of individual sectors in the sample of long-lived small firms is considered.

Manufacturing firms represent 34% of the stock of firms registered for V.A.T. in

[4] SIC is an abbreviation for Standard Industrial Classification codes. In Table 4.2, SIC codes 01-60 includes agriculture, heavy manufacturing, light manufacturing and construction. SIC codes 61-99 include the remaining categories running through from wholesales and retail to other services.

Scotland, whereas the remaining 66% are service-based. These percentages differ somewhat from the percentage of manufacturing and services firms registered for V.A.T. in the U.K. at 28% and 72% respectively. This perhaps reflects the slow progression of the Scottish industrial economy to a service base economy (particularly in agriculture, see sectoral breakdown for the UK and Scotland in Table 4.2 below). Of the ninety long-lived small firms extracted from the three parent samples, the principal activities of over a third (36%) of the mature small firms were in manufacturing, while the principal activities of the other two thirds (64%) were in services. These were remarkably close to their representation in the Scottish population of small medium sized enterprises. This was particularly fortunate because the Leverhulme (1985-1988) parent sample had a high proportion of manufacturing firms. Over half (60%) of the firms in the Leverhulme (1985-1988) parent sample were based in extractive/manufacturing sectors (SIC codes 01-60), reflecting the caseloads of the Enterprise Trusts and similar institutions at the time. Reflecting its membership constituency, however, services firms were over-represented in the Telephone Survey (1991) compared to national proportions. Eighty percent of firms in the Telephone Survey (1991) sample operated as services firms (SIC codes 61-99), (see Table 4.2). When firms from the Leverhulme (1985-1988) sample were combined with firms from the Telephone Survey (1991) sample and the Leverhulme (1994-1997) sample (which was not prejudiced in any direction), the distribution of long-lived small firms in manufacturing (SIC 01-60) and in services (SIC 61-99) reflected that in the Scottish population of small medium sized enterprises.

As seen in Table 4.2, when the three parent samples are combined into one large sample frame (N_T=219), most sectors, from agriculture to other services, are represented. Similarly, all sectors are broadly represented in the subset of long-lived small firms (N_s=90), identified from this sample frame. By comparing the percentages in different sectors for the subset of long-lived small firms (N_s=90), with the percentages registered for V.A.T. in various sectors in Scotland in 2001, it is found that sectors such as agriculture (2%), construction (3%) and other services (20%) were

Table 4.2: Sectoral Composition

Classification	Extracted Sample *(All firms)*								Extracted Sample *(Survivors)*								Survival rates %	Scotland[b] 2001	U.K.[b] 2001
	Frequency				Percentages				Frequency				Percentages						
	LI	Tel	LII	Total	LI	Tel	LII	Total	LI	Tel	LII	Total	LI	Tel	LII	Total			
Agriculture	1	3	-	4	1.2%	2.6%	-	1.8%	-	1	-	1	-	2%	-	1.1%	25%	20,005 (17%)	151,240 (9%)
Heavy manufacturing	16	1	1	18	18.6%	0.45%	11.1%	8.2%	10	-	-	10	40%	-	-	11.1%	56%	8,350 (7%)	149,325 (9%)
Light manufacturing	31	13	7	51	36.0%	12.0%	33.3%	23.3%	6	7	5	18	24%	14%	33.3%	20%	35%		
Construction	4	6	-	10	4.7%	5.3%	-	4.6%	-	3	-	3	-	6%	-	3.3%	30%	12,135 (10%)	171,680 (10%)
Wholesale & retail	8	45	2	55	9.3%	39.8%	11.1%	25.1%	2	20	2	24	8%	40%	13.3%	26.7%	44%	24,680 (21%)	380,045 (23%)
Hotel and catering	1	13	-	14	1.2%	11.5%	-	6.4%	1	7	-	8	8%	14%	-	8.9%	57%	10,275 (9%)	107,270 (6%)
Repairs, transport & storage	4	16	-	20	4.7%	14.2%	-	9.1%	1	7	-	8	4%	14%	-	8.9%	40%	4,860 (4%)	75,325 (5%)
Other Services	21	16	10	47	24.4%	14.1%	44.4%	21.4%	5	5	8	18	20%	10%	53.3%	20%	38%	38,385 (32%)	629,485 (38%)
Total	86	113	20	219	100%	100%	100%	100%	25	50	15	90	100%	100%	100%	100%	41%	118,690 (100%)	1,664,370 (100%)
Manufacturing (SIC 01-60)	52	23	8	83	60%	20%	40%	38%	16	11	5	32	64%	22%	33%	36%	39%	34%	28%
Services (SIC 61-99)	34	90	12	136	40%	80%	60%	62%	9	39	10	58	36%	78%	67%	64%	43%	66%	72%

Notes:

[a] 'LI' is an abbreviation for Leverhulme (1985-1988), 'Tel' is an abbreviation for Telephone Survey (1991) and 'LII' is an abbreviation for Leverhulme (1994-1997).

[b] The stock of V.A.T. registered enterprises represents the number of enterprises registered for V.A.T. at the start of the year with the Inter-Departmental Business Register (I.D.B.R.). This is an indicator of the size of the business population. Since over 99 percent of registered enterprises employ fewer than 50 people, it is also an indicator of the small business population. Coverage of enterprises will be poorer in V.A.T. exempt areas such as Health, Education and Public administration and of the very smallest on person businesses operating below the threshold for V.A.T. (from 1st April 2001 the V.A.T. threshold was an annual turnover of £53,000 sterling.)

Source: Small Business Service, April 2001

under-sampled, whereas heavy (11.1%) and light manufacturing (20%) sectors were markedly over-sampled. This is also true of the sample frame (N_T=219) of firms.

Similar percentages of firms survived in manufacturing (SIC 01-60) and in services (SIC 61-99), at 39% and 43% respectively. This is in line with Phillips and Kirchoff's (1989) findings for the United States (i.e. two out of five new firms survive at least six years). From Table 4.2, it is observable that there was some variation in survival rates within sectors. Survival rates were low in agriculture (25%) and construction (30%), and high in hotels and catering (57%) and heavy manufacturing (55%). Under-sampling of agricultural and construction firms may explain the low survival rates in these sectors. Low survival rates may also reflect a shorter lifespan of small firms in particular industries (i.e. for instance in the construction industry, see Hall, 1995; Phillips and Kirchoff, 1989). The strategies of the particular small firms extracted might also have influenced these survival rates.

4.2.2.2 Geographic Distribution

As seen in Table 4.3, the geographic scope of the three parent samples combined (N_T=219) is extensive. The Leverhulme (1985-1988) sample was primarily drawn from the Lothian (66%), Fife (20%) and Strathclyde (12%) regions of Scotland. On the other hand, the Telephone Survey (1991) had a high representation of firms from the Highlands and Islands. Almost a quarter (27%) of the firms sampled were located in this region. Other regions which were represented in this study include Grampian (12%) and Strathclyde (39%). The Leverhulme (1994-1997) sample was mainly drawn from Lothian (25%) and Strathclyde (60%).

The geographic distribution of the three parent samples combined (N_T=219), influenced the geographic distribution of the sample frame of long-lived small firms (N_s=90). Of the sample of ninety long-lived small firms extracted from the combined three parent samples, almost a fifth (18%) were located in the Highlands and Islands, nearly a third (30%) in Lothian and in Strathclyde and approximately a tenth (9%) in Grampian. Lothian and Strathclyde include two major urban hubs of Scotland, namely Edinburgh and Glasgow cities, where there are a high stock of firms registered for V.A.T. (see Table 4.4). The rates of new firm formation are high in these areas also. Stirling and Edinburgh have comparative rates of new firm formation with average rates

Table 4.3: Geographic Distribution

Classification	Extracted Sample *(All firms)*								Extracted Sample *(Survivors)*								Survival rates %
	Frequency				Percentages				Frequency				Percentages				
	LI	Tel	LII	Total	LI	Tel	LII	Total	LI	Tel	LII	Total	LI	Tel	LII	Total	
Highlands and Islands	-	30	-	30	-	27%	-	14%	-	16	-	16	-	32%	-	18%	53%
Grampian	-	14	2	16	-	12%	10%	7%	-	6	2	8	-	12%	13%	9%	50%
Tayside	1	7	-	8	1%	6%	-	4%	1	3	1	5	4%	6%	7%	6%	63%
Central	-	4	1	5	-	4%	5%	2%	-	2	-	2	-	4%	-	2%	40%
Fife	17	1	-	18	20%	1%	-	8%	2	-	-	2	8%	-	-	2%	11%
Lothian	57	8	5	70	66%	7%	25%	32%	20	2	5	27	80%	4%	33%	30%	39%
Strathclyde	10	44	12	66	12%	39%	60%	30%	1	19	7	27	4%	38%	47%	30%	41%
Borders	1	1	-	2	1%	1%	-	1%	1	-	-	1	4%	-	-	1%	50%
Dumfries and Galloway	-	4	-	4	-	4%	-	2%	-	2	-	2	-	4%	-	2%	50%
Total	86	113	20	219	100%	100%	100%	100	25	50	15	90	100%	100%	100%	100%	41%

Notes:

[a] 'LI' is an abbreviation for Leverhulme (1985-1988), 'Tel' is an abbreviation for Telephone Survey (1991) and 'LII' is an abbreviation for Leverhulme (1994-1997).

Table 4.4: Regional Distribution of Small Medium Sized Enterprises in Scotland

SCOTLAND	Stock 2001	% of Total	Per resident adult (16+)
Aberdeen City	5890	4.96	0.03
Aberdeenshire	9675	8.15	0.05
Angus	2870	2.42	0.03
Argyll & Bute	3210	2.71	0.04
Clackmannanshire	820	0.69	0.02
Dumfries & Galloway	5370	4.53	0.05
Dundee City	1980	1.67	0.02
East Ayrshire	2490	2.10	0.03
East Dunbartonshire	1785	1.50	0.02
East Lothian	1890	1.59	0.03
East Renfrewshire	1405	1.18	0.02
Edinburgh, City of	10780	**9.09**	0.03
Eilean Siar	1015	0.86	0.05
Falkirk	2485	2.09	0.02
Fife	6340	5.34	0.02
Glasgow City	10060	8.48	0.02
Highland	7995	6.74	0.05
Inverclyde	1095	0.92	0.02
Midlothian	1385	1.17	0.02
Moray	2460	2.07	0.04
North Ayrshire	2480	2.09	0.02
North Lanarkshire	4900	4.13	0.02
Orkney Islands	1410	1.19	**0.09**
Perth & Kinross	4750	4.00	0.04
Renfrewshire	3095	2.61	0.02
Scottish Borders, The	4100	3.46	0.05
Shetland Islands	1295	1.09	0.07
South Ayrshire	2605	2.20	0.03
South Lanarkshire	5880	4.96	0.02
Stirling	2790	2.35	0.04
West Dunbartonshire	1320	1.11	0.02
West Lothian	3015	2.54	0.02
Total	118640	100%	1

Source: Small Business Service, April 2001

in the U.K. (see Fraser of Allander Institute, 2001). Rates for Glasgow city are slightly lower. The sample (N_s=90) also represents areas where the stock of firms is low, but where the proportion of small medium sized enterprises per resident is high, such as in the Highlands and Islands. For example, the stock of firms registered for V.A.T. on Orkney island is 1,410, just over 1% of the total stock of firms in Scotland. Orkney,

however, has the highest proportion of SMEs[5] per resident adult (+16 yrs) at 0.09 (see Table 4.4). Furthermore, Orkney and the Shetland islands had the highest number of V.A.T. registrations between 1994 and 1999 in Scotland (see Fraser of Allander Institute, 2001).

From an examination of the survival rates across geographic regions presented in Table 4.3, it is observable that firms located in Tayside had the highest survival rate, almost two thirds (63%) of the firms survived. Survival rates are also relatively high in remote regions such as the Highlands and Islands, where over half (53%) of the firms survived. In areas where the stock of firms registered for V.A.T. is high, such as Strathclyde and Lothian (which contain Glasgow and Edinburgh cities respectively), the rates of survival are relatively lower. Approximately, two fifths of the small firms survived in these regions. This is tentative evidence in support of Westhead and Birley's (1993b) and Gallagher and Botham's (1998) findings that geographical areas with high rates of new firm formation are also those which have the highest death rates. The region of Fife is another example. It has the lowest survival rate (11%) in the sample frame (N_T=219), even though 5.34% of the stock of small medium sized enterprises registered for V.A.T. in 2001 were located in this region.

4.2.2.3 General Characteristics of the Extracted Sample

To extend the analysis above, summary statistics for the age and scale of extracted firms by parent sample, at the initial interview are presented in Table 4.5. Full-time equivalent employees and real turnover at constant 2001 prices measure the scale of these firms. This data is also broken down by survivor status.

On average, the mature small firms extracted from the Telephone Survey (1991) sample were older at the original interview than those extracted from the other parent samples [$Fstat_{(1, 218)}$ = 87.908 at p-value = 0.0001]. Thus, firms extracted from this parent sample are indeed long-lived. Generally, the extracted firms were micro-firms close to inception, employing on average less than 10 full-time equivalent employees.[6] Long-lived small firms (or surviving firms) were bigger in size as measured by real turnover than non-survivors [$Fstat_{(1, 218)}$ = 4.114 at p-value = 0.044] but not based on full-time equivalent employees [$Fstat_{(1, 218)}$ = 0.113 at p-value = 0.737]. Moreover,

[5] SMEs is an abbreviation for small medium sized enterprises.
[6] An outlier case raised the average size of the non-survivors in the Leverhulme (1994-1997) sample (i.e. A cleaning firm with eighty–five full-time equivalent employees).

Table 4.5: Mean Age, FTEs and Real Turnover of the Extracted Sample at time of Initial Interview, according to Survivor Status and Parent Sample

Sample	All Firms (N_T=219)			Survivors (N_S=90)			Non-Survivors (N_{NS}=129)		
	Age	FTEs	Real Turnover[a]	Age	FTEs	Real Turnover[a]	Age	FTEs	Real Turnover[a]
Leverhulme (1985-1988)	5	7	280,044	7	9	409,320	3	6	234,079
	(4)	(10)	(274,928)	(8)	(7)	(326,194)	(3)	(10)	(241,991)
Telephone Survey (1991)	15	7	382,681	15	7	436,171	15	7	358,908
	(11)	(10)	(371,251)	(11)	(8)	(447,705)	(11)	(11)	(333,743)
Leverhulme (1994-1997)	4	8	400,777	4	3	439,886	6	21	299,096
	(2)	(19)	(609,389)	(1)	(3)	(699,862)	(3)	(36)	(301,562)

Notes:

[a]Real turnover (reflated to constant 2001 prices)

Standard deviations are in parentheses

there was no difference in the age of survivors and non-survivors [$Fstat_{(1, 218)} = 0.661$ at p-value = 0.417].

4.2.3 Conclusion

Identifying long-lived small firms from previously interviewed (i.e. known) sources is advantageous. It provides the researcher with information on non-survivors. This information is useful in econometric estimation as corrections can be made for sample selection bias. Heckman's sample selection estimation procedure is undertaken in Chapter 8. Data gathered earlier in the life of long-lived small firms also enriches case analysis (see enterprise profiles in Volume II, Appendix 5). The advantages of this approach outweigh those of more probabilistic sampling methods. In the latter instance, there would not be data available on non-survivors. In any case, there is no guarantee that a probabilistic sampling design would have led to a more representative sample (i.e. from a geographic and sectoral perspective) than the non-probabilistic method adopted here. There is sampling error associated with all sampling methods. As the firms in the three parent samples were known sources, the likelihood of obtaining a high response rate was raised. The significance of this cannot be underestimated. For example, in relation to the Leverhulme (1985-1988) sample, Reid (1993) pointed out that if it wasn't for the respect the owner-manager had for the aid of the Enterprise Trust or Federation of Small Business, the response rate might not have been as high. Additionally, a low response rate would increase survey error (see Groves, 1989). The risk of low response rates is considerably higher when contacting firms cold. This is likely to be the case when using probabilistic designs.

4.3 The Design of the Administered Survey Instrument

The survey instrument was designed to address three general research objectives:

- To characterise the mature small firm and factors which influence its performance, scale and scope;
- To analyse the flexibility of the mature small firm in undertaking key organisational change;
- To examine behavioural relations between size, performance and other attributes of the mature small firm.

The survey instrument consists of 5 sections, 83 numbered questions and 5 show cards, which were colour coded to distinguish them from the main body of the instrument (refer to Volume II, Appendix 1 to view a copy of the survey instrument). Measures were constructed to extract information on the characteristics of the mature small firm, including changes in the scale and scope of its activities, pivotal changes in the running of the firm, factors which promoted the survival of the firm and the level of innovativeness and technological progressiveness of the firm. Guidelines for designing questions set out by Converse and Presser (1986) and Fowler (1995) were adhered to and are referred to below, where appropriate.

Two unique features of the design of the instrument include 1) a multi-dimensional scale where owner-mangers self appraise factors, which they believed influenced the survival prospects of the small firm and 2) a novel way of calibrating attributes of organisational change. The multidimensional scale is used to create a novel measure of performance, which is similar in form to a scorecard measure (see Section 6.3). The innovative way of calibrating processes of organisational change enables new measures of flexibility and firm-specific turbulence to be computed (see Section 8.2).

Most of the instrumentation was designed to gather numerical data, but qualitative measures were also included in the survey instrument, to amplify and illustrate the quantitative testing of inferences. For example, 'open-ended' questions were included on the vision of the founders, the nature of key organisational changes and factors which fostered the longevity of the mature small firm. This mixed design of the survey instrument facilitates methods of triangulation; thus qualitative evidence is useful for explaining quantitative results and for suggesting patterns of convergence between both these forms of evidence, see Tashakkori & Teddlie (1998). The qualitative evidence is presented in the form of detailed case studies in Volume II, Appendix 5.

The survey instrument was designed specifically to gather data on long-lived small firms and represents a significant contribution of this study. Each section of the survey instrument is discussed below to clarify the purpose and innovative features of the design of key measures. Let us proceed with a detailed analysis of the measures contained in each section of the survey instrument.

4.3.1 *General Characteristics of the Business*

The function of this section of the survey instrument is to produce a general picture of the typical long-lived small firm in the sample and to identify changes that occurred in the general characteristics of the firm and its competitive environment over time. Data were gathered on the long-lived small firm at two points in time; at inception and at the time of interview. As the sample frame of long-lived small firms was identified from three separate sources, gaps exist in the data gathered on these firms at earlier points in their lifecycle. Data were gathered on each of the three parent samples for different purposes and generally merely a few measures were consistent across the three studies (see Sub-section 4.2.1). As stated earlier, the Telephone Survey (1991) was brief and focused on funding shortages, (see Reid, 1996). This section of the instrument provided an opportunity to redress this issue by gathering data on the characteristics of the long-lived small firms at inception, retrospectively. The characteristics of long-lived small firms at extreme points such as 'inception' or at the time of interview (i.e. 'maturity') are salient events or attributes in the life of the firm. This eases the owner-manager's ability to recall the information (Eisenhower *et al.*, 1991). As data were gathered on the three parent samples at different points in time, and at different points in their lives, the collection of data at 'inception', and the use of this as a reference point should improve the overall quality of the data.

A series of questions was designed on the characteristics of the mature small firm, the extent of competition in its main market, its business strategy and its financial position. General questions on the mature small firm examined its main line of business, legal status (i.e. sole proprietor, partnership and private company) and the number of products[7] and product groups it offered. The main line of business was identified using a list of the standard industrial classification (SIC) codes on a show card (see Show card 1.2, Volume II, Appendix 1). Owner-managers were specifically asked to identity the three most relevant SIC codes, according to sales, as many firms supply products to different industries. The original list of SIC codes adopted in Reid (1993) and Smith (1997a) were used rather than the updated 1992 classification. This was for consistency purposes and to enable changes in the main line of business to be

[7] Everywhere the word 'product' is mentioned in the survey instrument the word 'service' was substituted for service companies in the interview. The same convention is adopted in the text here so the term product encapsulates tangible (physical products) and intangible (services) goods.

identified over time. The task of identifying the number of different products is more difficult than identifying the number of product groups or ranges (i.e. too numerous to count in a large retail shop or for bespoke products). However, with the wide use of computers in these small firms it is easier to obtain accurate information.

In examining the extent of competition in the mature small firm's main market, questions were included to assess the firm's market reach (whether it was local, regional, Scottish, British or International), the number of rivals (major and minor), its market share, the intensity of competition, the existence of excess capacity and the level of product differentiation (whether competitor's product offerings were identical, similar or different). This was complemented by a question on the market positioning of the small firm (i.e. low end, middle or top end of the market) to analyse how the firm strategically positions itself in its competitive environment. Finally, financial data were gathered on net profits for the last trading year (net of depreciation and director's remuneration), the book value of assets at the time of interview and at inception (or the most recent estimate), a count of the forms of debt (bank loan, overdraft, hire purchase etc.) and whether outside equity finance was employed. This financial data were used to generate objective measures of performance (e.g. asset growth, rate of profitability etc.).

Changes in the general characteristics of the firm and the competitive environment in which it operates were measured by proceeding in the following manner. The respondent, for example, was asked to describe the intensity of competition in their market at the time of interview using the response options provided in question 1.12.1, reproduced in Table 4.6 from Volume II, Appendix 1. The respondent was then asked if a change had occurred in the intensity of competition since start-up by asking as in 1.12.2 "Has this changed since start-up?" If the respondent replied affirmatively, they were further prompted to describe the manner of this change in consistent response options to those in question 1.12.1. So if a respondent stated that competition is intense in every aspect at the time of interview (coded as 1) but was less intense at start-up, they were prompted to say whether it was strong but weak in some aspects (coded as 2), generally weak but strong in some aspects (coded as 3) or generally weak in all aspects (coded as 4). Their retort could then be recorded numerically in the database. Three variables were created in the database. These

recorded the intensity of competition at the time of interview, whether a change occurred and the intensity of competition at inception. Using this approach, Sign's test for two related samples, which compares the number of positive or negative differences between scores and Wilcoxon's matched pairs signed rank test for two related samples, which also takes account of the size of the difference in the ranks could be conducted (see Chapter 5). These tests assess whether the mature small firms in the sample have changed in similar manner over time. Questions on market extent (question 1.8.1 – 1.8.2), market share (question 1.9.1 – 1.9.2), product differentiation (question 1.10.1 – 1.10.2) and market positioning (question 1.11.1 – 1.11.2) were all asked in a similar manner (refer to survey instrument in Volume II, Appendix 1).

Table 4.6: Survey Instrument - Questions 1.12.1 –1.12.2

1.12.1	How would you describe competition in your main market?		
	Intense in every aspect (price, quality rivalry etc)		☐
	Strong but weak in some aspects (for example absence of price competition but strong quality competition and inter-rivalry)		☐
	Generally weak but strong in some aspects		☐
	Generally weak in all aspects		☐
1.12.2	Has this changed since start-up?		
	Yes	☐	In what way? _____
	No	☐	

The format of question 1.12.1 and the response options are identical to the questions which Reid (1993) and Jacobsen (1986) posed to the Leverhulme (1985-1988) parent sample. This is a further feature of the design. Given that the data was gathered on the Leverhulme (1985-1988) sample in a consistent manner, it enables a longitudinal analysis of the data, or comparisons of the measures over time. Further, as the questions are worded consistently over time, the validity of collecting data retrospectively can be examined for this parent sample. For example, retrospective answers on the intensity of competition at inception (question 1.12.2) and similar retorts gathered on the Leverhulme (1985-1988) parent sample close to inception should be highly correlated. Moreover, these questions were already tried and tested on the

Leverhulme parent sample earlier in their life. At the time, the owner-managers understood and were able to answer these questions.

Sources of error may arise in the measurement of these questions from changes in perception of events over time. Errors may also arise where the respondent may never have had the information, such as in the case of a change in ownership or management. There is a large literature comparing self-reporting with proxy reporting (see Moore, 1988). There are occasions when it appears that people can report for others, as they do for themselves (e.g. family succession). However, unless questions pertain to relatively public events or characteristics as in the retrospective questions here, others will not know the answers. It is recognised that across all topics, self-respondents are better reporters than proxy respondents.

Prior to the interview, data was already gathered on general characteristics such as the age of the long-lived small firms in the sample because the sample frame consists of known sources. Information was also available on changes in ownership status (e.g. whether the firm is now run by a new owner following a trade-sale, or has been acquired by another firm, or whether another family member runs the firm). Changes in ownership status were known prior to the interview itself due to initial contacts with firms. The occurrence and the timing of these events were recorded on the cover of the survey instrument prior to interviews and discussed later in sections three and four of the interview.

The measures obtained in this section of the survey instrument are used to characterise the long-lived small firm and its market (see Chapter 5 and 7) and to analyse broad changes in these characteristics over time. It aims to construct a picture of the typical long-lived small firm in the sample, prior to undertaking further inferential analysis (viz. flexibility analysis and the simultaneous equations analysis) in Chapters 8 and 9. It is shown how the 'market reach' variable, measured in this section of the survey instrument, is determined jointly with size and performance in a three-equation simultaneous equations system in Chapter 9.

4.3.2 The Scale and Scope of the Firm

The objective of this section of the survey instrument was to examine changes in the scale and scope of the long-lived small firm over time. This is examined in the light of the owner-manager's objectives and vision for the business at start-up, his

expectations for the scale and scope of the business at inception, and his expectations of the nature of competition. Changes in the scale and scope of the small firm are considered because much of the extant small firms literature has focused on the relationship between growth and firm size, originating from the Law of Proportionate Effect (or Gibrat's Law), which states that growth rates are independent of size (see Sutton, 1997, 1998 and section 3.2 for a survey of the literature). This law was rejected in Reid (2001, 1995, 1993) for the case of the small firm. Reid (2001) concluded that smaller, small firms grow faster than larger, small firms but that this growth process stabilises and tends to a long run equilibrium value. Given that the firms interviewed in this study are long-lived, rather than close to inception, whether they have reached this equilibrium size needs to be investigated. This lifecycle hypothesis is examined in Sub-section 5.2.5.3.

In this section of the survey instrument, owner-managers were asked a series of questions on four issues. First, the aspirations of the long-lived small firm at inception and at the time of interview were examined. Second, the owner-managers were questioned on the expected, and actual, trajectory of turnover and full-time equivalent employees over the life of the firm. Then, the dimensions by which the small firm competes were considered and finally, changes in the administrative organisation of the firm from inception were explored. The section was structured in this manner, such that the scale and scope of the firm were examined in the light of the objectives of the owner-manager for starting the business (i.e. to improve the flow of questions). These series of questions are examined in turn below.

A number of questions were included initially on the aspirations of the owner-managers, on the length of the planning horizon for the firm, and on the expected lifetime for the business. Decision-making within very small firms is often closely linked to the personal aspirations of the owner-manager (Krueger *et al.*, 2000; Bamberger, 1983; Miller and Toulouse, 1986). Empirically, a distinction is made between positive motives (e.g. profit, growth etc.), and negative motives (e.g. alternative to unemployment, lifestyle etc.) (see Storey, 1994). The hypothesis explored is that those individuals starting a business with a positive motive are more likely to establish a business which subsequently grows, than those who start a business with a negative motive.

At the beginning of section 2 of the instrument, the owner-managers were presented with a list of possible aims for starting a business (i.e. positive and negative motives), to capture the effect of motivation. Evidence of the effects of motivations on growth is mixed (see Storey, 1994; Kinsella *et al.*, 1993; Wynarczyk *et al.*, 1993; and Wheelen and Hunger, 1995). Generally, positive motives were found to raise the growth prospects of firm. Reid and Smith (2000a) found that small business start-ups, which aimed to make a high rate of return, achieved higher levels of performance. An assessment of both the long-lived small firm's planning horizon at inception, and the expected lifetime of the business, was also obtained. Bhide (1994) was sceptical about the consequences of a rigid formal planning process for performance. Reid and Smith (2000a) found that the existence of a business plan was not, in itself, a predictor of success. However, a longer planning horizon was linked to the performance of the small firm (Smith, 1998; and Reid and Smith, 2000a). Qualitative evidence was also gathered on the owner-manager's vision for the business and the achievement, or otherwise, of milestones that they set for the business at inception.

Scale or size can be measured by many different economic variables, such as sales revenue, output volume, capacity, employment or assets. Any of these can be used in the estimation of variants of Gibrat's model (see Sub-section 5.2.5.3). However, to analyse the adjustment path to long run equilibrium, a trajectory of these economic variables over the life of the firm must be collected. Data were gathered on turnover and full-time equivalent employees, as owner-managers find it easier to recall these values rather than estimates of the book value of assets over the life of the firm. Sales turnover and the number of full-time equivalent employees also are not subject to differences in accounting conventions, such as policies on the depreciation of assets values etc.

Prior to examining the trajectory of sales and full-time equivalent employees, questions were included on the expectations of the owner-manager for the size of the business, measured in terms of full time equivalent employees and sales turnover, at the end of five and ten years of trading respectively. These figures form a base for comparison with the actual figures. Data gathered on FTEs and turnover were collected at the following points in the lifecycle; at inception (or after 1 year trading for turnover), after 5 years, 10 years, and at the time of interview (or the last trading year ended for

turnover). Points in time such as inception, after 5 years, 10 years and time of interview, were used for ease of recall only, and were loosely chosen to capture potential phases of development within the small firm. It is recognised that this process may not be linear across all firms (see O'Farrell and Hitchens, 1988; Hall, 1995).

The owner-managers were presented with the following context to tentatively test whether Reid's (1995) lifecycle effect occurs in practice; "Suppose a mature business is one which has reached its desired size in terms of employees and sales turnover" and then owner-managers were asked: "Would you say you are a mature business?" If they responded affirmatively, they were asked for the age, the turnover and the level of full-time equivalent employees of their business at maturity. These are the long run equilibrium size values, according to the owner-managers of the business. They can be compared to the equilibrium values produced by variants of Gibrat models.

Change in the competitive scope of the firm is another form of growth, be it geographic, segment, vertical or industry, see Porter, (1985). The main form of change in scope, which is measured in this section, is vertical scope. This is the number of activities performed in-house by the firm, instead of by independent firms. Changes in geographic scope are dealt with in section one of the survey instrument, whereas the other forms are dealt with in section three. To measure vertical scope, the activities which the firm performed at start-up and performed at the time of interview, as well as the timing of new activities undertaken in-house or activities abandoned, were identified. The activities were listed on Show-card 2.9. A completed version of this show-card is reproduced in Table 4.7 below. The activities listed corresponded to the primary activities and support activities in the value chain. However, these were worded in 'layman' terms for shared understanding as follows; accounting matters, training of personnel, computer support staff, production of product/service, sales, market research, strategic planning, innovations, legal matters and other. The type of activities undertaken later in the lifecycle, such as strategic planning also indicates that the firm is moving to a more mature stage in the lifecycle (see Churchill and Lewis, 1983). A count variable of the functional activities performed within the firm at the time of interview and at inception was used to approximate the scope of the administrative organisation at these points in time. Extensions to the scope of the

administrative organisation are considered, and relations between this variable and firm size, performance and age are examined, in Sub-section 7.3.1.

Table 4.7: Show Card 2.9

Show Card 2.9

Examine the following list of functions/activities performed within your business and answer the following questions:

2.9.1 Which of the following activities did your business perform in the first year of trading? [Tick all that apply]

2.9.2 Which of the following activities does your business perform currently? [Tick all that apply]

2.9.3 In cases where a change occurred how long since start-up did that change occur? [E.g. if your business is now engaging in an additional activity or has disengaged in an activity]

Activities	At start-up tick all that apply	Tick all that apply today	When? (months/years)
Accounting matters	☑	☑	
Training of Personnel	☑	☑	
Computer support staff	☐	☑	1996.
Production of product/service	☑	☑	
Sales	☑	☑	
Market Research	☑	☑	
After sales service	☑	☑	
Strategic planning	☑	☑	
Innovation	☑	☑	
Legal matters	☐	☐	
Other (Please specify)	☐	☐	
Other (Please specify)	☐	☐	

Thank you. Now please return this sheet to the interviewer.

The nature of competition is thought to be an important, but not a central influence, upon the growth rate of individual small firms, according to Smallbone *et. al.* (1992). An objective measure of the nature of competition is difficult to obtain. A direct measure, such as the number of rivals (minor or major) obtained in section one of the survey instrument, may not be related to the extent of competition. Firms can differentiate themselves or re-position their product offerings so that they are not in direct competition with rivals. Here, data on the form of competition was obtained by listing the following forms; price, quality, volume, after sales service, new product development, advertising, tying up suppliers, delivery, marketing, and other please specify. A frequency count of the number of forms of competition is used to classify the competitive strategy space of the firm as 'broad' or 'narrow'. It is presumed that a firm, which competes on a number of dimensions has a broad competitive strategy space and thus, is pursuing a differentiated, or niche based strategy, is sheltered from direct competition. A firm competing on a narrow number of dimensions is pursuing a less differentiated strategy. This is hypothesis is challenged in Sub-section 7.2.2. Evidence of endogeneity was found between this measure of the competitive strategy space and performance. A simultaneous equation model was developed and estimated in Chapter 9, where size, competitive strategy space and performance are jointly determined.

This was followed by questions on the objectives of the owner-manager for the firm at this more mature stage in the small firm's lifecycle. The wording of the question on the owner–manager's objectives at this stage, was similar to the question which the owner-managers were presented with on their aims for the business at inception. The only difference was a slight change in the emphasis of some of the response options. For example; motives, such as, to have a sizeable pension on retirement, to create employment in the community and to increase the value of the business on trade-sale were included. Bamberger (1983) stated that objectives are strongly influenced by the firm's lifecycle phase. This is analysed in Sub-section 7.2.1. Qualitative evidence were also gathered on the reasons why, or why not, the business had, or had not, met the owner-manager's expectations. This provided owner-managers with an opportunity to explain why the business failed to meet their expectations (i.e. lack of growth etc.)

As the ownership of some of the surviving firms from the parent sample had changed, it is unlikely, except in the case of a family-owned business or a management/employee buyout, that the respondent would have knowledge of the founding owner–manager's objectives, vision or expectations, or of the scale or scope of the business at start-up. However, rather than inserting a filter question implying that these respondents would not answer any of these questions, the same questions were asked of the new owner-manager. Thus, similar information was gathered for the new owner-manager with respect to the time of trade-sale. This occurred in very few cases because the vast majority of changes in ownership involved either family succession or employee/management buyouts.

The measures gathered in this section of the survey instrument were used to characterise the long-lived small firm (see Chapters 5-7). In Chapter 5, Gibrat's model was estimated for sales turnover, full-time equivalent employees and a ratio of these two measures, labour productivity, over different time horizons. This provides an analysis of adjustments in scale as the firm matures. Chapter 7 describes the motives of the owner-manager, the competitive strategy space and the scope of the administrative organisation. Chapter 9 estimates a simultaneous equations model where size, performance and the measure of competitive strategy space are jointly determined.

4.3.3 Organisational Change

The function of this section of the survey instrument is to calibrate key organisational change within the firm. These changes can be thought of as permanent changes or critical decisions, which the firm makes over the course of its life. They can be 'positive' or 'negative' in implication and essentially are pivots rather than crisis points (see Section 2.2). They are treated below as contingent events, in other words, driven by environmental forces or other factors, which impinge on the firm (see Donaldson, 1994). Examples of key organisational changes examined in this study include changes in ownership, legal form, technology, location, cashflow, innovation, line of business, investment, number of outlets, market niches, product range, market positioning, diversification, assets, capacity, inputs and management.

Reid and Smith (2000b) used contingency theory to explain changes in the management accounting system of small business enterprises close to inception. The design of the measures in their survey instrument influenced the design of measures in

this section of the survey instrument. Reid and Smith (2000b) in the design of their survey instrument asked the owner-managers to consider a contingency such as a cashflow crisis by asking, "Have you ever experienced a cashflow crisis?" initially, and then proceeding to ask, "When did you have your most severe cashflow crisis (m/y)?" This required the owner-manager to identify the year and month of their most severe cashflow crisis or the timing of this contingency. The owner-managers were then asked if they implemented a number of methods for managing costs (or 'adaptations'). For the methods that they did employ, they were asked to identify when they were first implemented, in terms of months/years. Duration variables were calculated from the point of inception for the contingent event and each adaptation. The duration variable for the contingent event could be correlated with the duration variables for the adaptations. Significant positive correlations indicate that the timing of these events are related. This was an innovative design, which relied on contingency theory. However, while association measures could be calculated, cause and effect could not be isolated. This element of the design is improved upon here.

Organisational change is calibrated as follows: the owner-managers were presented with a list of key organisational changes (e.g. ownership, management, cashflow, business line etc.) on Show-card 3.1, reproduced in Table 4.8. The 'other please specify' option was also offered. The owner-managers were asked to select the main changes, which occurred in the operation of their small firm since start-up. Once they checked the relevant organisational changes, they were then asked to specify the age of the business when these changes occurred in months/years. This created a duration variable from the point of inception for each organisational change that had occurred. The completed version of Show-card 3.1 shown in Table 4.8 illustrates how the responses were recorded and also shows a snapshot of the development path of the long-lived small firm.

Table 4.8 Show card 3.1

Show card 3.1

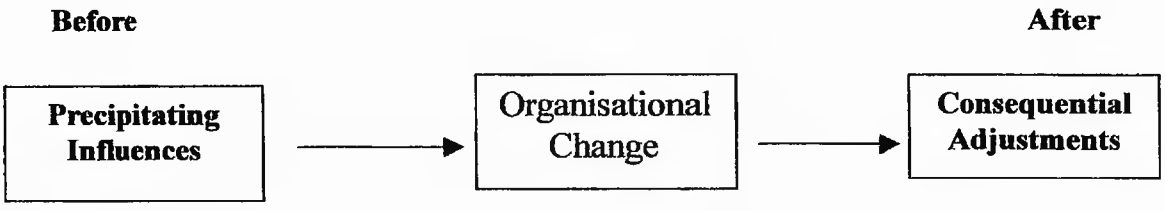
3.1.1 From your point of view what are the main changes in running the business since start-up? Could you choose from options on this sheet?

3.1.2 Please specify the age of the business (in months/years) when these changes occurred

	Changes	Tick all that apply	Age of business (yr/mths)
(a)	**Ownership**	☐	
(b)	**Legal form**	☐	
(c)	**Technical**	☑	1978
(d)	**Location**	☐	
(e)	**Cashflow** (3)	☑	1980
(f)	**Innovation**	☐	
(g)	**Line of business**	☐	
(h)	**Investment**	☐	
(i)	**Number of outlets**	☐	
(j)	**Market niches**	☑	1985
(k)	**Product range** (1)	☑	1985
(l)	**Market positioning**	☑	1982
(m)	**Diversification**	☐	
(n)	**Assets** (2)	☑	1982
(o)	**Capacity**	☑	1985
(p)	**Inputs**	☐	
(q)	**Management**	☐	
(r)	**Other (Specify)**	☐	
(s)	**Other (Specify)**	☐	

For the key changes identified by each long-lived small firm, the owner-manager was asked to select those three which were most important to the running of their business, since inception. Just three changes were extracted for more detailed consideration because pilot work had suggested that this was the best way of capturing salient information from the interviewing. They were then asked to provide qualitative evidence on these three organisational changes. In practice, the owner-managers were specifically asked to describe the exact organisational change, the reasons for change and the adjustments, which were made following the change. This qualitative evidence was formalised for each of the three changes in turn. The procedure adopted is explained directly below.

Figure 4.1: Explanation of Causation



A simple diagrammatic device (see Figure 4.1), which formed part of Show-card 3.3 reproduced here in Table 4.9, was used in interviews with owner-managers to explain the focus of interest and to embed changes in organisational form within a contingency framework. It was explained that the interviewer wanted to know what had precipitated change in organisational form and what adjustments had been made after it had been achieved. The term 'precipitating influences' was used to describe the forces, which led to the change in organisational form (i.e. the contingency factors). In a similar vein, the term 'consequential adjustments' was used to describe those adaptations which followed the change in organisational form.[8] Figure 4.1 made the pattern of causal relationships quite explicit. This in turn, made it easier to get owner-managers to estimate the intervals of time that occurred between precipitating

[8] The precipitating influences were called 'prior factors' and the consequential adjustments were called 'adaptation factors' on the Show-card 3.3 to ensure that the owner-manager clearly understood the direction of causation.

influences and organisational change, and between organisational change and consequential adjustments.

Table 4.9: Show card 3.3

Show card 3.3

Change:

Before **After**

Prior Factors → **Change** → **Adaptation factors**

[Tick the relevant prior factors and then tick the relevant adaptation factors.]

Before	*Factors*	*After*
☐	1. **Growth**	☑
☐	2. **Demand**	☑
☐	3. **New niches**	☑
☐	4. **Tax efficiency**	☐
☐	5. **Credit policy**	☐
☐	6. **Finance**	☐
☐	7. **Profitability**	☐
☐	8. **Cost Changes**	☑
☐	9. **Sales**	☑
☐	10. **Competition**	☐
☐	11. **Marketing**	☐
☐	12. **Trade intelligence**	☐
☐	13. **Capacity**	☑
☐	14. **Access to buyers**	☑
☐	15. **Stock levels**	☑
☐	16. **Regulation**	☐
☐	17. **Technology**	☐
☑	18. **Operational Efficiency**	☑
☐	19. **Investment**	☑
☐	20. **Delinquent suppliers**	☐
☐	21. **Delinquent debtors**	☐
☐	22. **Headcount**	☑
☐	23. **Cost control**	☑
☑	24. **Skills**	☑
☐	25. **Mix of suppliers/customers/rivals**	☐
☐	26. **Monitoring**	☐
☑	27. **Functions of manager**	☑
☐	28. **Cashflow**	☑
☑	29. **Other (specify)**	☐
☑	30. **Other (specify)**	☐

Thank you. Now please return this sheet to the interviewer.

For each of the three most important organisational changes which occurred over the mature firm's lifetime, the following line of inquiry was conducted. First, the owner-managers were presented with a show-card on which they could identify precipitating causes and consequential adjustments (e.g. credit policy, finance, trade intelligence and cash-flow). They were asked to identify the precipitating influences ('*Precipitator*') from a list of 30 such factors which impinge on the firm in the format displayed in Show-card 3.3 (see Table 4.9). Second, the owner-managers were asked to identify the number of months ('*PrecipitatorTime*'), which elapsed between identifying the precipitating cause and the undertaking of the organisational change within the firm. Third, owner-managers were asked to identify the consequential adjustments ('*Adjust*'), which followed the change in organisational form. Fourth, the owner-managers were asked to identify the number of months ('*AdjustTime*'), which had elapsed between the occurrence of the organisational change and the appearance of the consequential adjustment. The factors listed in Show-card 3.3 were chosen openly. For example, if a respondent checked demand as a precipitating or an adjustment factor, it could be as a result of either an increase or a decrease in demand. The important thing was that a change had occurred in this factor, which drove or followed the organisational change. The information was recorded on a separate show-card for each of the three most important changes. This process was therefore undertaken three times with learning by the respondent on the first repetition of the process being transferable to the second and third repetitions.

Quantitative and qualitative data were recorded in the database for each organisational change (or contingent event). Each precipitating influence ('*Precipitator*') and consequential adjustment ('*Adjust*') checked in Show-card 3.3 was coded as "1" in the database and "0" otherwise (i.e. quantitative data). The length of time between each precipitating influence and the organisational change ('*PrecipitatorTime*') and the length of time between each organisational change and consequential adjustment ('*AdjustTime*') were also recorded numerically in months. Qualitative evidence on each precipitator and consequential adjustment was also entered into the database. This would specify, for instance, if demand were checked, whether it was an increase in demand or decrease etc. Show-card 3.3 reproduced in Table 4.9

above, records a change in ownership in a Chandlery. The qualitative evidence entered into the database, including the description of the change, is as follows;

Description of Change:

The previous owner N wanted to retire. The current owner W told her of his interest in buying the business. He was a customer of Company X as he owned a fishing trawler. N was getting old. She decided to employ a partner/manager to relieve the pressure of operating the business. W had lost his fishing trawler in an accident so he entered the business as a partner of N in 1982. W bought out N over 3 years. He paid her £3,000 a month. W could not do that now given the lack of tourists. Now W and his wife are partners running the business. N continued to work in the business for 7 years. She retired in 1989. N was good at letting W do his own thing. There was a lot of reorganisation of the business in 1982. W took over the management e.g. displays, orders. The business is a growing since 1982.

Precipitating Influences:

Operational efficiency had to improve. N was not able to manage on her own anymore. N needed to increase skills levels by bringing someone into the business interested in purchasing the business. N wanted to reduce her management function. W had expressed an interest. N knew she wanted to retire sometime in the future. W had the necessary ship chandlery skills.

Consequential Adjustments:

Achieved increased profits, sales, cashflow and growth. Cost changes occurred as the business needed to pay W's income as well as N's. Capacity increased. Got access to more buyers. Invested in stock. Operational efficiency improved. Headcount increased, skills increased, functions of manager were taken over by W. The firm entered new niches in 1991. N retired in 1989.

As stated above, one of the differences in this design and that of Reid and Smith's (2000b) is that cause and effect are identified. Cause and effect is explicit because the real time of the precipitating influences and the consequential adjustments are identified. However, though cause and effect is isolated, the *a priori* link, or the mechanism, by which the change occurred, is not identified by this design. The mechanism can be explained through inductive reasoning from the qualitative evidence recorded and this can be used to explain the results of estimated models. The enterprise

profiles presented in Volume II, Appendix 5 use the qualitative evidence to explain the results of estimated models in this manner. The consequential adjustments made, following the organisational change, enable the form of change to be calibrated. This has never been done in empirical applications of contingency theory. The contingency factors, (or the precipitating influences), which drove the change, and the change itself, are solely examined. It is probable that small firms will evaluate the cost and benefit of adapting to changes in the environment or contingency factors and will only do so if there are implications for the performance of the firm (i.e. The firm may adopt a real options approach). In Section 7.4, the frequency of occurrence of these changes, the nature of the changes, and their timing over the lifecycle of the firm are examined. This Chapter also explores the numbers of precipitators heralding change in organisational form and the number of consequential adjustments following the organisational change. Measures of small firm flexibility can be computed from the real time data recorded. The calibration of these measures is described in Section 8.2.

4.3.4 Factors which Foster Survival

This section of the survey instrument gathered data on factors which fostered the survival of the long-lived small firm (e.g. technology, industry growth, debt etc.) some of which were identified in Section 3.3. It also questions owner-managers of the long-lived small firms on a related issue which can foster the longevity of the small firm namely, the end game of the firm (e.g. family succession, trade-sale, asset disposal, management buyout etc.). An end game may enable a business to continue trading even though the founder has retired from the business.

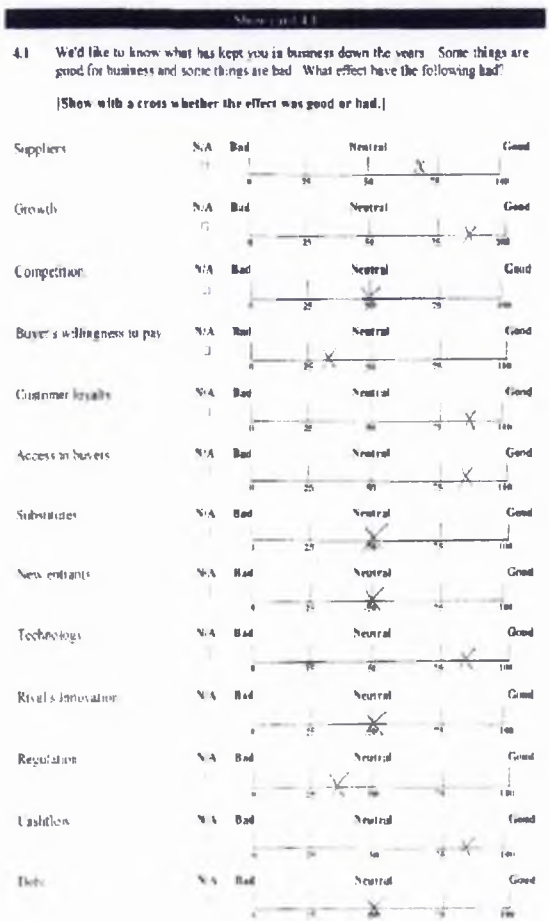
Under perfect competition, a small firm will not survive in the long run unless it generates economic profit or rent ($\pi \geq 0$) (see Barney, 1991). Mature small firms in this sample have clearly passed this long-run economic test of survival. Even though this criterion is easily observable, it is only a proxy for economic profit. It is neutral on insights into the drivers of long-run survival. To assess factors which contributed to the survival of small firms over the long haul, question 4.1 in the survey instrument lists items that fostered the longevity of the firm on a scale to be rated (e.g. market research, differentiation, cashflow).

Items were selected for inclusion in the scale based on theoretical relationships to hypothesised dimensions of performance described by Sandberg and Hofer (1987)

and Chrisman *et al.* (1998). In addition, items were included based on evidence presented in Section 3.3 describing the determinants of post entry performance (e.g. location, debt, growth, technology, innovation). Twenty-eight items were incorporated into the scale under the following headings: environmental (11 items); financial (4 items); business strategy (9 items); and internal organisation (4 items). Chrisman *et al.* (1998) extended Sandberg and Hofer's (1987) model, which described new venture performance as a function of the entrepreneur, strategy and industry structure, to include resources and organisational structure. This approach would see there being an indissoluble link between the setting of performance standards and the control of the firm by the owner-manager. The most commonly conceived performance standards relate to budgets. However, there are many other forms including those relating to human factors, for example responsibility, and to technological ones, like hitting research milestones (see Wickham, 1998).

The key question put to owner-managers was as follows: *"We'd like to know what has kept you in business down through the years. Some things are good for business and some things are bad. What effect have the following had?"* The owner-managers were then asked to rate each of the 28 items on a scale of 0 to 100, where 100 is 'good', 0 is 'bad', and 50 is 'neutral'. They did so by placing a cross on a line, of length 100 units. In this way, the influence they judged this item to have had was calibrated, based on their actual experience of running the business. If an item was not applicable, the owner-managers were asked to say so by checking the box provided. A copy of the scale presented to the owner-manager on show-card 4.1 is reproduced here in Table 4.10. It is similar in appearance to a scorecard on which owner-managers rate the influence of each item on their performance. In fact, ratings are used to calibrate a novel measure of performance described in Section 6.3.

Table 4.10: Show Card 4.1



Credit Policy

Capital requirements

Market positioning

Location

Cost Control

Quality

Market research

Differentiation

Advertising

Product/Service Mix

Diversification

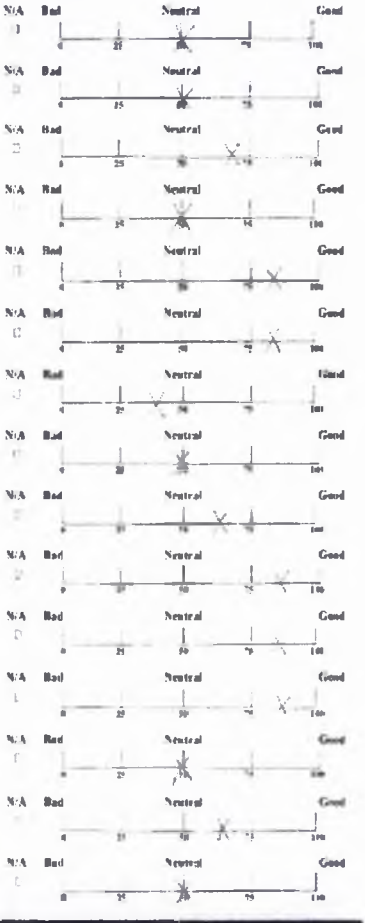
Operational efficiency

Skills

Monitoring

Filling product gaps

Thank you. Now please go



on this sheet to the interviewer.

As long-lived small firms were operating for a sufficiently long period of time, it was believed that owner-managers were now readily able to draw on their experience of running their businesses, in self-appraising the influence that each of these items had on their performance. In doing so, the owner-managers had in their minds a large body of qualitative and quantitative evidence, on which they could base their judgments of performance. To illustrate; over time, they had learned how best to combine their factors of production to exploit market opportunities, and they had learned how to respond to threats in a way that improved their performance and enhanced their survival. Given that in order to survive, owner-managers comfortably juggle these various factors in their own minds, it was considered logical to seek an explicit measure of how this juggling act is sustained.

A scale was thought to be the best design, as the instrument would be long and unwieldy if questions were to be asked regarding each scale item in turn. Detailed data on a few factors is sacrificed for a quantitative assessment of the influence of a comprehensive list of 28 factors, each of which was calibrated on a 100-point scale. A simple, single question on self-appraisal of performance could, of course, have substituted for multi-item scales. However, DeVellis (1991) argues that the latter has two main advantages over the single question approach. First, it produces detailed measurement across a wide spectrum of variables (i.e. drivers of performance), rather than a single variable (or driver). Second, by diluting variable specific effects, it produces a more comprehensive (and stable) measure of what is meant by long run survival, therefore allowing common influences to come through.

Rating factors along a continuum is a much easier task than ranking the list of factors from top to bottom especially for long lists of factors. Rating items allows rankings to be tied (see DeVellis, 1991). The 100-point scale used here to rate each item with the neutral position in the centre, conjures up the familiar image of a speed dial or gears in a car (i.e. clearly defined neutral position). This is an easy and familiar image for the respondent to understand. The responses have a clearly ordered component. As the continuum ranges from 0 to 100, the extent of variation in the responses of owner-managers will be higher rather than if fewer response options were offered. The consistency with which owner-managers rate scale items is also improved

by defining the 'meaning' respondents should assign to middle alternatives using adjectival labelling of scale points, (see DeVellis, 1991).

A number from, 0 to 100, was entered into the database for each item rated. This number was based on the point were a cross was made by the respondent on the 100 point continuum for each scale item (see Table 4.10). Entering the data in this format may be criticised as being subjective, however on a scale of 0-100, the margin of error is quite small, so such criticisms are unsubstantiated. Factor analytic techniques can be used to analyse this data and were adopted in Chapter 6 to explore the underlying determinants of the scale (i.e. the subjective performance measure).

This measuring exercise provides a new form of empirical evidence on factors, which foster the survival of the small firm, based on judgements, but nevertheless useful in econometric estimation. It differs from the regular approach adopted in the literature, which analyses differences between surviving firms and non-surviving firms to explain longevity (Segarra and Callejón, 2002; Mata and Portugal, 2002, 1994; Mahmood, 2000; Mata *et al.*, 1995; Audretsch and Mahmood, 1995; Audretsch, 1991, 1995; Doms *et al.*, 1995; Dunne and Hughes, 1994; and Reid, 1993). As stated above, from the self-assessment of each item's influence on the survival of the firm, a new overall measure of performance can be computed by summing the individual item scores.

Few studies cover all the items examined in this scale. The self-assessment scores provide comprehensive evidence on a range of factors not examined previously in any one study. Qualitative evidence was also gathered on the three most important items, which owner-managers of long-lived small firms believed fostered their survival. Therefore, items' scores were verified by real events. Enterprise profile B; a hospital supplies firm, stated that suppliers were the single most important factor which fostered their survival. According to the owner-manager, "*suppliers identified well accepted products which were ahead of the rest and which we want to be in*".

Three straightforward questions were asked of owner-managers about their end-game strategy. The first was a filter question, which asked the owner-manager; "Do you expect the business to keep trading well into the future? (Yes/No)". Those who answered "No" were asked to explain why not. This gathered qualitative evidence on potential reasons why a business would not continue trading once the

owner-manager retired. For those who responded affirmatively, the owner-manager was asked to indicate his expected end-game (i.e. trade sale, family succession, management/employee buyout or other). This established whether the owner-manager believed that a market existed for his business, the likelihood of family succession and whether management or employees were equipped to buy out the owner-manager. The "other (please specify)" option captured different potential choices open to the owner-manager. The responses to these questions are examined in Section 7.5. A comprehensive analysis of potential end-games for long-lived small firms has received inadequate attention in the literature (see Tajnikar and Došenovič, 2003).

4.3.5 Innovation and Technology

Much of the small firm's literature has considered small firms as innovators or agents of change (see Audretsch, 1991, 1995; Acs and Audretsch, 1987, 1988). As stated in the acknowledgements to this thesis, Enterprise Ireland kindly granted funding for the collection of data using the survey instrument under the International Collaboration Programme 2001 to 2002. This section on the level of innovativeness and the technological progressiveness of the long-lived small firm was included in the survey instrument to meet the requirements of the sponsoring body. The section aims to measure the extent of innovation undertaken by the firm. In particular, it assesses the level of product and process innovation carried out by the firm and gauges the use of information technology within the firm. It also examines the level of technical change in industries where long-lived small firms operate.[9] The measures included in the section were adapted from an instrument developed by Prof. Reid and Dr. Smith (see Smith, 1997a, 1999; Reid and Smith, 2000a). They were tested on the Leverhulme (1994-1997) sample in the mid 1990s. Consequently, the discussion here focuses on the content of this section of the survey rather than on the design of the questions per se.

The most significant innovation undertaken by small firms is normally embarked on at inception, 'the entrepreneurial event' (Reid, 1992, 1999). Thus, owner-managers were first asked: "How innovative were you at start-up?" with response categories; Not at all, a little, quite a lot and a lot. Owner-managers who

[9] This evidence can also be linked to other evidence gathered on innovation in section 3 and section 2 of the survey instrument, where information was gathered on new innovations, technical change and whether the firm engaged in innovation and market research as a separate activity within the firm.

responded positively were then asked to describe the main type of innovation they undertook. They were asked to choose one of the following options; Quality, new products or services, new technology, marketing techniques, operational efficiency; and other. This was a forced choice question. Forcing respondents to choose a particular form of innovation avoids problems of acquiescence (see Converse & Presser, 1986). Long-lived small firms may have undertaken innovation in all these categories, but they were forced to choose the main area of innovation. This produces a concise measure of the chief area of innovation, which these long-lived firms undertook at inception.

The next four questions pertained to process innovation. Process innovation was defined initially as follows; 'A process innovation is a new way you do things, which firms already do [e.g. how you cut a component; how you advise a client; how you overhaul an engine]'. Once presented with this definition, the owner-managers were asked; "What best describes the extent of innovation in your use of processes since start-up?" The respondent was asked to choose one of the following responses; No change, slight change, significant change and important change. This generated an ordinal measure of the extent of process innovation undertaken within the firm. Long-lived small firms which changed their processes since start-up were then asked to identify the main driver of this change from the following list: Imitation of rivals; hints from trade or professional journals; suggestions from customer; suggestions within the firm; suggestions from supplier, new staff 'carrying in' knowledge; and other (please specify). This question was also forced-choice. It assesses whether process innovations in small firms are derived externally or from internal learning. Subsequently, the level of process innovation undertaken by principal rivals was considered, as well as the level of competitive pressure placed on the firm by the process innovations of rivals. The owner-managers were provided with the same response categories to both these questions to reduce learning; none, a little, a lot, and don't know.

The next seven questions pertained to product innovation. As above, product innovation was defined initially, as follows: 'A product innovation is a new good or service that you can sell to meet a newly discovered customer need.' Once presented with this definition the owner-managers were asked; "How many new

products/services have you developed since start-up?" They were asked to choose one of the following responses; none, 1-5, 6-10, 11-20, and more than 20. This produces an ordinal measure of the extent of product innovation undertaken within the firm. Small firms which engaged in product innovation since inception were asked if they reaped rewards from doing so, with the following response categories; Not as much as expected, a little, or a lot. If they reaped rewards from innovations, they were asked what form these rewards took; increased market share, increased profitability, both of these, or other. If they failed to reap rewards from product innovations, they were asked if they experienced difficulties launching product/services onto new markets, and the form of these difficulties; developing a sales strategy, getting customers to try the product, or other. These questions were not asked previously by Reid and Smith (2000a) but were included here to extract information on the difficulties small firms may face in reaping rewards from product innovations (Geroski and Machin, 1992). The level of product innovation undertaken by principal rivals and the level of competitive pressure placed on the firm by product innovations of rivals were measured as above for process innovations. The final question on product innovations assessed whether patents, copyright, trademarks or the rapid exploitation of innovations are required to protect innovations in their respective industries (Dosi, 1988). Its function was to see if long-lived small firms could protect their innovations from imitation by rivals and therefore reap greater rewards.

The next three questions pertain to information technology (I.T.). As above, information technology was defined initially, as follows: 'Information technology refers to devices businesses used to transmit and process general information (e.g. telephone fax, PC)'. Once presented with this definition, the owner-managers were asked; "What kinds of IT do you use?" They chose options from a comprehensive list provided (see question 5.10 in Volume II, Appendix 1). The importance of information technology to their business was also assessed. This produced an ordinal measure, with the response categories 'unimportant', 'important' and 'very important'. From the list of the following response options; networking, producing accounts, managing dealings with buyers/suppliers, monitoring performance targets, designing new products, gathering information on the activities of rivals, operational efficiency

and setting targets or plans, the owner-manager was asked to select activities for which they employ information technology.

The final three questions in the survey examined the level of technical change faced by the long-lived small firm in its industry over its life. A filter question assessed initially whether there was technical change in the small firm's industry. In order to discover the sources of this change those owner-managers who responded affirmatively were asked who the prime initiators of technical change were (i.e. market leaders, newly emerging innovators etc.). They were then asked to reflect on their experience of using new technologies since start-up and to state which of the following declarative statements best reflected their experience;

> We haven't used new technologies.
> We have implemented new technologies but rarely successfully.
> We have implemented new technologies but not always successfully.
> We have generally been successful in implementing new technologies.

This provides an ordinal measure of success in the implementation of information technologies.

The measures obtained from this section of the survey are examined in Chapter 7. They are related to growth in sales and employment and other measures of post entry performance to challenge existing hypotheses using new data on long-lived small firms. The measure of industry technical change is used as an explanatory variable in the performance and size equations in the simultaneous equations analysis in Chapter 9.

4.3.6 Conclusion

This section described unique features of the design of the survey instrument for this study. Detailed measures incorporated in this survey were not gathered previously on a sample of long-lived small firms, or in some cases, on any sample of small firms. This permits new hypotheses to be challenged using new measures and existing hypotheses to be challenged using new data. The measures developed within the survey instrument enable a characterisation of the long-lived small firm (see Chapters 5-7), the development of a novel measure of performance (see Chapter 6) and the calibration of new measures of firm flexibility (viz. agility and speed) and firm-specific turbulence (see Chapter 8). These new measures are used in inferential analysis in Chapters 8 and 9. Chapter 8 examines the relationship between the

measures of firm flexibility, firm-specific turbulence and the new measure of performance. In Chapter 9, a simultaneous equations analysis of the relation between size, performance and variables such as market extent and competitive strategy space is conducted. Qualitative evidence is used to triangulate the results of inferential analysis in the case study evidence presented in Volume II, Appendix 5.

4.4 Fieldwork Methods

Prof. Reid and the author collected the data through face-to-face interviews with the owner-managers of 63 long-lived small firms between October 2001 and February 2002.[10] This section outlines the lessons learned from piloting and the interviewing techniques applied. It also discusses variations in response rates in the extracted sample frame of long-lived small firms by parent sample.

4.4.1 Pilots

Six pilot interviews were undertaken. The sample of six small firms was identified by tracing the survivors of a pilot study, undertaken by Prof. Reid, for the Leverhulme (1994-1997) project.[11] From this pilot study of thirteen firms, five were still in business. Four of these survivors agreed to be interviewed. Another two firms were selected for inclusion in the pilot, from the main sample of 150 firms, based on their proximity to the University of St. Andrews.

According to Converse and Presser (1986, p.74), a pilot study is a "*dress rehearsal*"; a test of the entire data collection process, not only a test of the survey instrument. They state that it "*is not a time to repair gross errors, or to make new explorations. It is a time for cutting, trimming, splicing, rearranging and filling in new skip patterns, formatting for clarity and polishing*" (p.74). All questions were tested to examine the level of variation in responses, to see if respondents understood the correct meaning of questions, to examine the difficulty of the task facing respondents in answering the questions and to assess the interest and attention of the owner-managers in the content of the survey. The flow and naturalness of the sections, the order of questions, skip patterns and the time it took to conduct the interview were also

[10] Professor Reid interviewed nine firms in the sample and the author interviewed the remaining fifty-four firms.

[11] Dr. Smith and Ms. Nilkes also interviewed the firms in the Leverhulme (1994-1997) sample. The Leverhulme Trust endorsed this project.

considered. The main lessons learned from piloting and a brief description of the representativeness of firms involved in the pilot study are outlined below.

4.4.1.1 Pilot sample

The greater the diversity of cases that are used in a pilot study, the more rigorous is the testing of the survey instrument. A brief description of the firms, which participated in the pilot, is presented below in Table 4.11.

They are a mixed bunch of firms, which are slightly younger than the firms that were interviewed as part of the sample for this study. The average age of these firms was 8 years at the time of interview.[12] They vary in terms of size, from 'one-man outfits' to those employing 12 full-time equivalent employees, and in terms of turnover, from generating gross sales of £15,000stg. to £3million stg. Two of the small firms that were included in the pilot study, had experienced a change in ownership, to explore how new owner-managers dealt with the questions posed in the survey instrument (e.g. questions on aims for the business and on pivotal changes etc.). In the first case, two partners, who ran a financial advisory service for employees of the NHS, then bought a property-letting agency. They bought the property-letting agency to add to their business portfolio, and to provide themselves with a main street presence. Unfortunately, they found it difficult to monitor both businesses and this letting agency wasn't doing as well as they desired. The second case was a Golf Holiday Company, which was acquired by a London based company. The Golf Holiday Company operates in Scotland as a subsidiary of this firm. The original owner still had a significant share in the business and continued to run the Scottish office. The ownership of the other cases in the pilot study may not have changed, but they faced different issues of organizational transformation. For example, a carpet retailer had a number of retail outlets in one of the main urban centres of Scotland. Attempts by the owner-manager at regional expansion were unsuccessful. As another example a music store faced a lot of competition from larger retailers and had to re-position itself within the market place to compete. Such diversity of cases improved the challenge to the survey instrument.

[12] Although these firms do not meet our criteria for a long-lived small firm (≥10 years old), they are approaching this age. We did not wish to use any of the extracted 90 long-lived survivors for this pilot study in order to maximise our potential valid sample size. It was felt that firms identified for the pilot while younger, at eight years of age, had experienced a sufficient amount of organisational change to adequately test the questions in the survey instrument.

Table 4.11: Descriptions of Firms in Pilot

Line of business	Ownership	Type of business	Employees (FTEs)*	Sales (£000 stg)	Assets** (£000 stg)
Painting Holidays	No change	Sole trader	1	15	-
Shellfish Farm	No change	Partnership	2	200	-
Carpet Retailer	No change	Partnership	12	1500	130
Property Letting Agency	Trade sale	Partnership	3.5	120	10
Music Retailer	No change	Sole trader	1	56	60
Golf Holidays	Takeover	Private Company	6	3000	-

Notes * FTE is an abbreviation for full-time equivalent employees.
** Asset values are missing either because they are unknown to the respondent or the question was not asked in the early version of the instrument.

4.4.1.2 The Findings of the Pilot Study

There were a number of issues which emerged during the pilot study. They are not all outlined here. The focus of the discussion is on the more significant findings. A number of changes were made to the content of the survey and to the ordering, wording and design of survey questions as the pilots were being undertaken. These changes enhanced the measures included in the survey and the flow of the instrument, as well as easing the difficulty of the response task. They are described in turn below.

In general, it was found that the length of time to administer the survey was too long. It took on average between 1.5 – 2 hours to administer. Therefore, to improve response rates, the instrument was reduced in length so that it could, if necessary, be conducted in one hour. Questions on the trajectory of performance (profitability) over its lifecycle were omitted as the respondent had difficulty remembering the trajectory of profits. The flow of the instrument was improved through including filter questions (see question 1.12.2 in Table 4.6). This increased the speed at which the instrument could be administered. The number of categories in various measures were reduced, where possible, to cut down on completion time. Repetition between section one of the survey instrument on general characteristics and section three on changes in the ownership and management was eliminated. Questions on changes in ownership and management were omitted from section 1 and assessed in section 3. This information was also obtained during initial contacts with the firm and recorded on the cover of the

survey instrument prior to the interview, as indicated above. Additional questions were included on the owner-manager's end-game, because in the clinical examination of these mature small firms, it seemed to be one of their greatest concerns. Thus, the quality of information gathered was not sacrificed for greater brevity. Solutions were sought to ease administration, without sacrificing the quality of reporting.

Section three of the instrument, on organisational change, and section four, on factors which fostered survival, benefited significantly from piloting. Initially, section 3 considered pivotal points or more radical changes in the running of these businesses. However, many small firms do not change radically over their life, but make small changes, which are important from their point of view, and involve a lot of reorganisation. Thus, this section was entitled 'organisational change' and a broader list of changes was provided (see Show-card 3.1, Table 4.8). Originally, Show-card 3.3 consisted of two separate show-cards; one for 'precipitating influences' and another for 'consequential adjustments' respectively, which had to be completed by the owner-manager for each change. This process was lengthy and unwieldy. The factors listed on each show-card were also more specific detailing the direction of the change such as 'a fall in profit margins'. It was decided during the pilots that this process needed to be simplified resulting in the compact design of show-card 3.3, which is much easier to understand and administer. The evidence gathered on organisational change is the same but the process is now more simple.

The design of Show-card 4.1 also changed. Four sub-scales, rather than a single multi-item scale, listing factors which fostered survival, was initially presented to the respondents. However, the owner-managers were not required to be familiar with the multi-dimensional nature of survival to answer the question. The four sub-scales made the show-card look unnecessarily complicated. Thus, it was redesigned such that it was single dimensional; the number of words were reduced and only one question was asked. Originally, each owner-manager was asked whether they felt an individual factor had a 'negative' or a 'positive' effect on the longevity of the firm. This was simplified using phrases such as 'bad' and 'good' as owner-managers had difficulty with the words 'negative' and 'positive'. Greater variation in the intensity of owner-manager's responses was also sought.

To show how careful piloting can simplify the design of questions to aid understanding and for ease of administration, copies of the original show-cards for show card 3.3 and show card 4.1 are presented below in Tables 4.12 and 4.13 respectively. These can be compared to Tables 4.9 and 4.10 respectively.

4.4.2 Data Collection Process

As indicated above, the data were collected using face-to-face interviews. The advantages of using this method of data collection are that the interviewer can answer respondents' questions and probe for adequate answers (Fowler, 1993). More complex question designs can also be used. Visiting the premises of the small firm and meeting the owner-manager builds rapport with these firms and also permits the collecting of documentation and (where applicable) product samples. A visual sense of the product, the operations of the firm and the market it serves is attained, which can be useful in explaining the respondent's answers. In general, the job of the interviewer is to enlist the cooperation of selected respondents, to train and motivate respondents and to ask questions, record answers and probe incomplete answers in a standardised way (see Fowler & Mangione, 1990). The principles adopted in this study are outlined below.

Table 4.12 Show Card 3.3 Before Piloting

Show card 3.3

Pivotal Point:

3.3.1 Below are potential drivers of pivotal points within firms. Was this pivotal point driven by any of these factors?

3.3.2 By how many months did each factor precede the pivotal point?

3.3.3 Please indicate the most important driver of the pivotal point.

	Factors	Tick all that apply	How long before?
(a)	Increased business risk		
(b)	A change in demand		
(c)	New market niches emerging		
(d)	Existing legal form was no longer tax efficient		
(e)	Inadequate credit policy (e.g. with buyers or suppliers)		
(f)	Needed to raise additional debt		
(g)	A fall in profit margins		
(h)	Higher wage costs		
(i)	Poor sales performance relative to competitors		
(j)	A change in the intensity of competition		
(k)	Higher costs of equipment and materials		
(l)	Limited capacity to cope with sales growth		
(m)	A need to be more accessible to buyers		
(n)	Greater co-ordination necessary with suppliers of inputs		
(o)	Stock levels were too high		
(p)	New firms entering market		
(q)	A need for greater involvement in sales and marketing		
(r)	Obsolescence of existing technology		
(s)	Inefficiencies in operation of business		
(t)	Losing customers to rivals		
(u)	Delinquent suppliers		
(v)	Delinquent debtors		
(w)	Other (Please specify)		
(x)	Other (Please specify)		
(y)	Other (Please specify)		

Main Driver: _____

Thank you. Now please return this sheet to the interviewer

Show card 3.4

Pivotal Point:

3.4.1 Below are adaptations to pivotal points within firms. Please indicate if they are relevant for each pivotal point.

3.4.2 How long (in months) after a pivotal point did these changes occur?

3.4.3 What did you feel was the main adaptation following the pivotal point?

		Tick all that apply	How long after?
(a)	Additional finance was raised (e.g. debt or capital)		
(b)	Investment in new equipment/machinery		
(c)	Investment in new premises		
(d)	Entered a new market niches (with existing or new products)		
(e)	A change in the number of employees		
(f)	A change in production volume		
(g)	Cost control measures (e.g. Reduce overtime, reduce wage bill)		
(h)	A change in the organisation of the firm (e.g. from functional lines to product lines etc.)		
(i)	A change in type of customer served		
(j)	A change in the mix of buyers		
(k)	A change in the mix of suppliers		
(l)	A change in firm assets (divest/invest new equipment etc.)		
(m)	Increased sales effort		
(n)	A change in the main output (e.g. product) mix		
(o)	A change in the product offering (e.g. quality changes more differentiated from rivals)		
(p)	A change in the image of the business (e.g. refurbishment of premises)		
(q)	Hired skilled employees		
(r)	Increased goodwill or reputation of business		
(s)	Captured the business of customers from rivals		
(t)	Improvements in operational efficiency		
(u)	Appointments of part-time staff		
(v)	A change in the style of management (i.e. more layers of hierarchy)		
(w)	Other (Please specify)		
(x)	Other (Please specify)		

Main Strategic Change: _____

Thank you. Now please return this sheet to the interviewer

Table 4.13 Show Card 4.1 Before Piloting

Show card 4.2

Examine the table on this card which is split into 4 factor which influence the longevity of your business. These are the market environment, finance, the internal organisation and strategy. The attributes of these 4 factors are also listed. These factors and their attributes may have positively or negatively affected the longevity of your business. The next two questions ask you to assess their influence on the longevity of your firm.

4.2.1 Please indicate whether you consider the attributes of the following factors to have a negative influence or a positive influence on the longevity of your business? Tick not applicable (N/A) if this is in fact the case.

4.2.2 For each factor can you please tell me whether it had a strongly negative, negative, neutral, positive or strongly positive effect on the longevity of your firm?

Influences on Longevity of your Business		Negative Influence	Positive Influence	N/A
Factor	Market Environment			
Attributes	Ability to negotiate on price with suppliers			
	The growth potential in your main market			
	The intensity of competition in your market			
	The sensitivity of customers to price changes			
	Customer loyalty			
	Access to distribution channels			
	Substitute Goods			
	The number of new entrants			
	Technological changes in industry			
	The level of innovation in market (eg. new products, change in process of production)			
	Regulation			
	Other (Please specify)			

Influences on Longevity of your Business		Negative Influence	Positive Influence	N/A
Factor	Financial			
Attributes	Cashflow of the business			
	Use of outside equity			
	Level of Debt			
	Credit policy			
	Level of investment in the business			
	Other (Please specify)			

Influences on Longevity of your Business		Negative Influence	Positive Influence	N/A
Factor	Internal Organisation of Firm			
Attributes	Mix of inputs used in production (Includes employees and equipment etc.)			
	Coordination of functions within the firm (e.g. by product or functional lines)			
	Improvements in operational efficiency			
	Motivation of owner manager			
	Skills of management			
	Skills of employees			
	Other (Please specify)			

Influences on Longevity of your Business		Negative Influence	Positive Influence	N/A
Factor	Strategy			
Attributes	Market positioning (e.g. low end, middle or high end)			
	Pricing Policy of product/service			
	Market development (e.g. sell new product varieties or product ranges)			
	Cost control			
	Steadfast attention to customer service			
	Filling product gaps			
	Advertising			
	Trade intelligence on rivals			
	Market research			
	Product Quality			
	Level of product differentiation			
	Other (Please specify)			

Factor	Influence on longevity				
	Strongly negative	Negative	Neutral	Positive	Strongly Positive
Market environment					
Finance					
Internal organisation of firm					
Strategy					

Thank you. Now please turn over sheet to the next show card

To conduct the fieldwork, the sample of firms was divided up into sub-samples; 10-15 long-lived small firms in the sample frame, which were located in close proximity to each other. The sub-sample of long-lived small firms, which was bordering the University of St. Andrews, was contacted initially. The initial contact with the firms was via a pre-letter, which identified the author, explained the nature of and rational for the study, the process by which mature small firms were selected for inclusion, the time required for the interview and the benefits to the owner-manager of participating. It also assured the owner-managers that absolute confidentiality would be upheld and signalled that the author would contact them in the near future. Three versions of this letter were composed, one for each of the three 'parent' samples, from which long-lived surviving firms were traced. Multiple letters were written for reasons of simplicity and to reduce the length of the letter. Volume II, Appendix 2 contains a draft of each of these three letters. They were posted on headed writing paper from the Centre for Research into Industry, Enterprise, Finance and the Firm, C.R.I.E.F.F, and signed by Professor Reid and the author.

The owner-manager was then contacted by telephone within a week of posting the pre-letter in order to gain his co-operation and to arrange a convenient time for the interview. The telephone protocol, which was applied, is outlined in Volume II, Appendix 3. It indicates in a general sense, the terms on which the data from this conversation were gathered and it acts as a checklist while on the telephone with the owner-manager, to ensure that the complete agenda were covered. It was not applied rigidly as some respondents had individual concerns, which needed to be addressed over the telephone. The design accepted that the interviewer should judge the best approach to adopt to persuade an owner-manager to partake (Fowler and Mangione, 1990). If the owner-manager agreed to be interviewed, a copy of the agenda and a letter confirming the date and time of the interview was forwarded to him. A copy of this is presented in Volume II, Appendix 2. The directions to the business premises of the owner were downloaded from www.yell.co.uk, using the postcode of the point of departure to the destination point.

At the beginning of the interview, a preamble clarifying the interview procedures was explained to the respondent to put them at ease. This is reproduced here:

> The questionnaire is divided into 5 sections which include questions on the characteristics of your business, your expectations at start-up for the size and scope of your business, changes in the running of your business, factors which fostered your survival and the level of innovation of your business. The typical way in which we shall proceed will involve my asking a question and then noting your reply. In addition, there are a number of lists from which you will be asked to choose options. It is helpful to begin in a general way. This will help us to identify the main features of your business before going into detail. May we begin with the general questions?

The shortest interview time was approximately 50 minutes, but not unusually 2 to 2.5 hours were spent in the company of the owner-manager, not only addressing the questions delineated in the questionnaire but looking around the business premises and discussing issues faced by long-lived small firms. Based on this, a great deal of qualitative evidence was gathered and recorded in the qualitative database under 'comments'. It is very difficult to gather this form of evidence by any other method of data collection. This information was invaluable in compiling the case studies presented in Volume II, Appendix 5.

Face-to-face interviews were applied in all cases except for two firms, which operated on the islands off the coast of Scotland. Time and money prevented the author travelling to these islands. However, rather than lose these firms from our sample, sections 1, 2, 4, and 5 of the survey instrument were forwarded by post to these respondents for completion. Once they returned the completed survey, they were telephoned by the author and section 3 was completed over the telephone and answers to any of the other questions, which were left blank or were ambiguous were clarified over the telephone. This worked quite well.

At the end of the interview the owner-manager was thanked for cooperating and the next stage was explained as follows:

> This is the end of the questionnaire. Thank you for completing it. I hope you have also derived some interest yourself from doing so. Your time and cooperation are very much appreciated. Let me remind you that the strictest confidentiality will be upheld regarding the information you have provided about your business. If you should be so interested in our general findings regarding the development of small businesses we will be more than happy to share these results. We hope that our research will contribute to the success and growth of small business. We wish you all the very best with the future of your business.

The owner-managers were also formally thanked in writing for their co-operation. A copy of this thank-you letter is provided in Volume II, Appendix 2. A copy of a report on the findings was also forwarded to all respondents at a later date.

4.4.3 Response Rates

Overall sixty-three firms were interviewed out of ninety long-lived small firms in our sample frame. This represents a response rate of 70%. The level of non-response did vary across the three 'parent' samples as can be seen from Table 4.1. Four-fifths (80%) of the eligible long-lived small firms from the Leverhulme (1985-1988) sample responded, three-fifths (61%) from the Telephone Survey (1991) sample and over four-fifths (86%) of the eligible long-lived small firms from the Leverhulme (1994-1997) sample were interviewed.

The owner-managers of firms, which were interviewed on face-to-face basis in the past, such as firms from the Leverhulme (1985-1988) and Leverhulme (1994-1997) parent samples, were familiar with C.R.I.E.F.F and the value of participating in such a study. The Telephone Survey (1991) had the lowest response rate because rapport was not developed with the owner-managers of this parent sample in the earlier interview. It is difficult to do this over the telephone. In addition, it was more difficult to get owner-managers of those firms, which had changed ownership to respond (cases in which a trade-sale occurred rather than family succession), because of their lack of awareness of C.R.I.E.F.F and the firm's participation in earlier studies. Given that these firms are long-lived, a large proportion had changed ownership. Nearly a fifth (16%) of the long-lived small firms interviewed had changed ownership through a trade-sale or acquisition.

The composition of the sample of long-lived small firms interviewed is as follows: almost half (47%) the long-lived small firms interviewed were originally selected form the Telephone Survey (1991) sample; a third (32%) were from the Leverhulme (1985-1988) sample; and a fifth (21%) were from the Leverhulme (1994-1997) sample. The general characteristics of these long-lived small firms are discussed in Part IV.

4.4.4 Conclusion

Section 4.4 outlined the fieldwork methods used in this study. The value of piloting survey instruments is illustrated. This demonstrates clearly how the survey instrument evolved to its final form. Solutions were developed without sacrificing the quality of the data. This 'dress rehearsal' for the main study ensured that the measures in the survey document were finely honed and that the data collection process was tested.

Certainly interviewing owner-managers on a face-to-face basis allowed complex question designs to be administered. Further, the qualitative evidence obtained from meeting owner-managers on site is not matched by any other data collection methods other than perhaps participant observation. As the sample of long-lived small firms was identified from known sources, this significantly increased the response rate to the survey. In general, the data collection process, which took place between October 2001 to February 2002 ran very smoothly. As seen from above, a number of steps were under taken to ensure that the data collected was of a very high standard.

4.5 Database Design

The data gathered was qualitative and quantitative in nature. Thus, two separate databases were set up in SPSS, one for the quantitative data and another for the qualitative evidence. The primary sorting key, which is the Firm ID number, enables interaction between both quantitative and qualitative forms of data recorded for this study. In total there are 635 variables in the quantitative database. The codes for these variables and their definition are provided in Volume II, Appendix 4. Data entered into the qualitative database was entered verbatim. Each question, which gathered qualitative evidence, was entered row by row into the database for each respondent. An additional row was entered for the comments by the owner-manager at the end of the interview and observations of the interviewer.

In general, quantitative variables were coded in a format, which facilitated flexible data analysis. For example, a precipitator such as demand was coded as "1" if it was checked, and "0" otherwise. This allowed frequency counts to be calculated. The year in which a change in the running of the business occurred was entered into the

database to enable the transformation of this variable into a duration variable. This permitted the data to be manipulated with ease for analysis.

4.6 General Conclusions

This Chapter set out to analyse the composition of the sample frame of long-lived small firms. This was followed by a discussion of the design of the survey instrument used in fieldwork. Finally, the fieldwork methods adopted in the study were outlined. The main contributions of this Chapter are also in these three areas.

First, it outlines a convenient approach to identify long-lived small firms for further study. The use of known sources increases the response rate to such a study. Evidence gathered on small firms earlier in their lives (survivors and non-survivors) can be used to correct performance measures for selectivity bias in econometric testing (see Chapter 8). This evidence can also be used to test the validity of data gathered retrospectively. Finally, access to detailed evidence on these firms earlier in their lifecycle enriches case analysis (see Volume II, Appendix 5).

Second, this chapter discussed the construction of novel ways to calibrate organisational change, and factors which foster the survival of the long-lived small firm. New measures of flexibility, firm-specific turbulence and performance are generated using the data gathered with the survey instrument. These measures are used in inferential analysis in Part V (viz. flexibility and simultaneous equations analysis). As a result new evidence from the quantitative testing of hypotheses is presented on the long-lived small firm.

Third, the quality of data collected on long-lived small firms is another major contribution. Many of the measures included in this study have not been gathered for such a sample of firms previously. The time and effort spent travelling to the long-lived small firm's site and the lengthy discussions with the owner-manager about the measures in the survey instrument ensures that the quality of the data obtained is high. In addition, the qualitative evidence obtained from examination of the firms' products and production process etc. could not have been obtained by any other data collection method.

The mix of evidence gathered implies that the results of quantitative econometric testing of hypotheses can be further clarified by using the body of

qualitative evidence recorded. Detailed analytical enterprise profiles of seven firms are presented in Volume II, Appendix 5 to illustrate the quantitative results of this study. They also show the range of qualitative evidence, which is available on these long-lived small firms.

CHAPTER 5 CHARACTERISTICS OF THE LONG-LIVED SMALL FIRM

5.1 Introduction

This Chapter presents a comprehensive description of the typical long-lived small firm in the sample using data collected in face-to-face interviews with the owner-managers of 63 long-lived small firms in Scotland. The analysis of the Chapter is divided into two sections. Section 5.2 examines the general characteristics of the long-lived small firm whereas Section 5.3 describes the market environment in which the long-lived small firm operates.

A number of features of the long-lived small firm are described in characterising the firms in the sample. Initially, the geographic and sectoral representativeness of the sample of 63 long-lived small firms interviewed is asserted. The relevant distributions in the sample are compared to their distribution in the Scotland and U.K. population where appropriate. Then, focusing on the age of the long-lived small firm, the influence of generational issues on the likelihood of survival is considered, as well as learning by the mature small firm. This is followed by an analysis of the size of the firm (as measured by FTEs and real turnover) and its relationship to age. Having described the size of the long-lived small firm, its organisational form is presented, and differences in size and efficiency across the organisational forms are explored. Finally, growth in size over the lifecycle of the long-lived small firm is considered. In particular, the empirical relevance of Gibrat's Law of proportionate effect at different points in the lifecycle of the firm is investigated (see Sutton, 1997, 1998). Such an analysis has not been conducted previously for a sample of small firms, although, it builds on empirical work by Reid (2001), who performed a similar analysis for small firms over shorter periods, early in their lifecycle, rather than at different points over the lifecycle, as the small firm matured. Jovanovic (1982) argued that firm growth is independent of size for mature firms, however, little evidence was found to support this proposition. In fact, Evans (1987a) found evidence to the contrary. He rejected Gibrat's Law for mature firms defined as firms older than age 7, 20 or 45. This Chapter examines support for Gibrat's Law at different points in their lifecycle for the sample of firms to see if evidence in support of Jovanovic's (1982) special case exists.

After distinguishing between 'hostile' and 'benign' market environments (see Covin and Slevin, 1989; Covin *et. al*, 1999), Section 5.3 sets out to characterise the market

environment in which the long-lived small firm operates and to form an assessment of the hostility of this environment. Initially, the geographical reach (e.g. local, regional, national etc.) of the firm's market for its principal product is examined as well as changes in the geographical extent of the market over time. Then, the hostility of the principal market of the long-lived small firm is explored through an examination of rivalry (viz. number of major rivals, a gauge of the intensity of competition), niche plays (viz. holding a larger share of smaller markets and engaging in product differentiation) and the role of excess capacity.

In this Chapter a variety of univariate and bivariate statistical techniques are applied to test inferences in accordance with small sample distribution theory. In examining changes in the characteristics of the market over time, broad changes are analysed (between start-up and the time of interview) rather than marginal organisational changes at each sequential stage of development. In general, the characterisation of the long-lived small firm provides a reference point for understanding the results of inferential analysis discussed in Chapters 8 and 9 and it complements evidence on the enterprise profiles presented in Volume II, Appendix 5.

5.2 Firm Characteristics

A number of characteristics of the long-lived small firm are presented in this Section. Subsection 5.2.1 begins with an analysis of the sectoral and geographical scope of the sample of 63 long-lived small firms. The importance of generational issues and age in promoting the longevity of the firm is discussed in Subsection 5.2.2 as well as the relationship between entrepreneurial learning and the age of the firm. Subsection 5.2.3 considers the size of the long-lived small firm as approximated by turnover and fulltime equivalent employees and its dependence on age. The organisational form of the long-lived small firm, approximated by the legal status of the firm, is studied in Subsection 5.2.4. Differences in firm size and efficiency across the three organisational forms are explored. Subsection 5.2.5 examines growth in the scale of the firm's operations over the lifecycle and analyses adjustments in the growth path of the long-lived small firm.

5.2.1 The Geographic and Sectoral Composition

The geographic and sectoral composition of the sample of 63 long-lived small firms is determined by the composition of the parent sample of 219 firms and survival rates within different geographic areas and different sectors. Tables 4.2 and 4.3 presented survival rates for the parent sample within different sectors and geographic areas respectively. In this Chapter the sectors and geographic regions covered by the sample of 63 long-lived small firms interviewed are briefly compared to the distributions of firms in Scotland and the UK, to show that the sample is representative of the population.

An examination of Table 5.1, which presents the sectoral composition [by 2-digit Standard Industrial Classification (SIC) code] of the 63 mature small firms in the sample, shows that most sectors, running through from agriculture (01) to domestic services (99), were represented. The main sectors (defined by largest share of annual turnover) included were: 32, mechanical engineering (4.8%); 43, textile industry (4.8%); 61, wholesale distribution (4.8%); 64, retail distribution (23%); 66, hotels and catering (4.8%); 67, repair of consumer goods and vehicles (6.3%); and 83, business services (9.5%). The typical long-lived Scottish small firm in the sample is a retailer. Similarly, the modal firm registered for VAT in Scotland is a retailer. This differs for the UK where the modal sector is a business service firm. Refer to Table 5.2, which presents the stock of small medium sized enterprises by sector for Scotland and the United Kingdom. It also presents the sectoral composition of the sample of 63 long-lived small firms interviewed as part of this study for comparative purposes.

The overall split between extractive/manufacturers (SIC 01-60) and services (SIC 61-99) according to the primary SIC code is 37% and 63% respectively. This split closely resembles the proportions in manufacturing and services in the Scottish population at 34% and 66% respectively. The proportions in manufacturing and services are also comparable with figures for the extracted sample (N=219) and the sample frame of long-lived small firms (N=90), see Table 4.2. Figures for the UK as a whole suggest that 28% were in manufacturing and 72% of small firms were operating in the services sector (see Table 5.2). The proportions differ slightly for the UK because of the slower progression of the Scottish economy to becoming service based, compared to the UK as a whole (see Subsection

Table 5.1: Sectoral Composition of Long-lived Small Firms

SIC	Classification	SIC		
		1st N=63	2nd N=37	3rd N=13
01	Agriculture and Horticulture	1 *1.6%*		
11	Fishing		1 *2.7%*	
22	Metal Manufacturing	2 *3.2%*	1 *2.7%*	
32	Mechanical Engineering	3 *4.8%*	1 *2.7%*	1 *7.7%*
34	Electrical and Electronic Engineering	2 *3.2%*	1 *2.7%*	
35	Manufacture of Motor Vehicles and Parts	1 *1.6%*		
36	Manufacture of Other Transport Equipment		1 *2.7%*	
37	Instrument Engineering	2 *3.2%*		
41/42	Food, Drink and Tobacco Manufacturing	2 *3.2%*	1 *2.7%*	
43	Textile Industry	3 *4.8%*		1 *7.7%*
47	Manufacture of Paper and Paper Products, Printing and Publishing	2 *3.2%*	1 *2.7%*	
48	Processing of Rubber and Plastics	2 *3.2%*	1 *2.7%*	
49	Other Manufacturing Industries	1 *1.6%*	3 *8.1%*	
50	Construction	2 *3.2%*	1 *2.7%*	
61	Wholesale Distribution	3 *4.8%*	1 *2.7%*	1 *7.7%*
63	Commission Agents	1 *1.6%*		
64/65	Retail Distribution	**15** ***23.8%***	***8*** ***21.6%***	
66	Hotels and Catering	3 *4.8%*		
67	Repair of Consumer Goods and Vehicles	4 *6.3%*	4 *10.8%*	**3** ***23.1%***
83	Business Services	6 *9.5%*	5 *13.5%*	**3** ***23.1%***
84	Renting of Movables	2 *3.2%*	1 *2.7%*	
95	Medical and Other Health Services	1 *1.6%*	1 *2.7%*	
96	Other Services Provided to the General Public	1 *1.6%*		
97	Recreational Services and Other Cultural Services	2 *3.2%*	2 *5.4%*	2 *15.4%*
98	Personal Services	1 *1.6%*	2 *5.4%*	1 *7.7%*
99	Domestic Services	1 *1.6%*	1 *2.7%*	1 *7.7%*
	Percentage in Services Sector	63%	68%	78%
	Percentage in Extractive/Manufacturer Sector	37%	38%	22%

Table 5.2: Stock of Small Medium Sized Enterprises By Sector

Sector	Scottish Sample	Scotland[a b] 2001	UK[a b] 2001
Agriculture; Forestry and fishing	1	19,735	149,670
	(1.6%)	(16.6%)	(9.0%)
Mining and quarrying; Electricity, gas and water supply	-	270	1,570
		(0.2%)	(0.1%)
Manufacturing	20	8,350	149,325
	(31.7%)	(7%)	(9.0%)
Construction	2	12,135	171,680
	(3.2%)	(10.2%)	(10.3%)
Wholesale, retail and repairs	**23**	**24,680**	380,045
	(36.5%)	**(20.8%)**	(22.8%)
Hotels and restaurants	3	10,275	107,270
	(4.8%)	(8.7%)	(6.4%)
Transport, storage and communication	-	4,860	75,325
		(4.1%)	(4.5%)
Financial intermediation	-	715	15,545
		(0.6%)	(0.93%)
Real estate, renting and business activities	8	24,255	**440,540**
	(12.7%)	(20.4%)	**(26.5%)**
Public administration; Other community, social and personal services	5	11,965	152,395
	(7.9%)	(10.1%)	(9.2%)
Education; Health and social work	1	1,450	21,000
	(1.6%)	(1.2%)	(1.3%)
Total	63	118,690	1,664,370
	(100%)	(100%)	(100%)
Percentage in Extractive/Manufacturer	37%	34%	28.4%
Percentage in Services	63%	66%	71.6%

Notes: [a]Source: Small Business Service, April 2001

[b]The stock of VAT registered enterprises represents the number of enterprises registered for VAT at the start of the year with the Inter-Departmental Business Register(IDBR). This is an indicator of the size of the business population. Since over 99 percent of registered enterprises employ fewer than 50 people, it is also an indicator of the small business population. Coverage of enterprises will be poorer in VAT exempt areas such as Health, Education and Public administration and of the very smallest one person businesses operating below the threshold for VAT (From 1st April 2001 the VAT threshold was an annual turnover of £53,000 sterling.).

4.2.1.1). There is a strong representation of firms engaging light and heavy manufacturing (31.7% versus 7% in Scotland and 9% in the UK) as opposed to firms in agriculture and construction, which are under-represented in comparison with figures for Scotland and the UK. However, the proportion of light and heavy manufacturing firms in the sample frame was high also reflecting the caseloads of directors of Enterprise Trusts in the mid eighties (see subsection 4.2.1.1).

Typically, the mature small firm's broad industrial sector (i.e. whether manufacturing or services) at the time of interview was dependent on their industrial sector

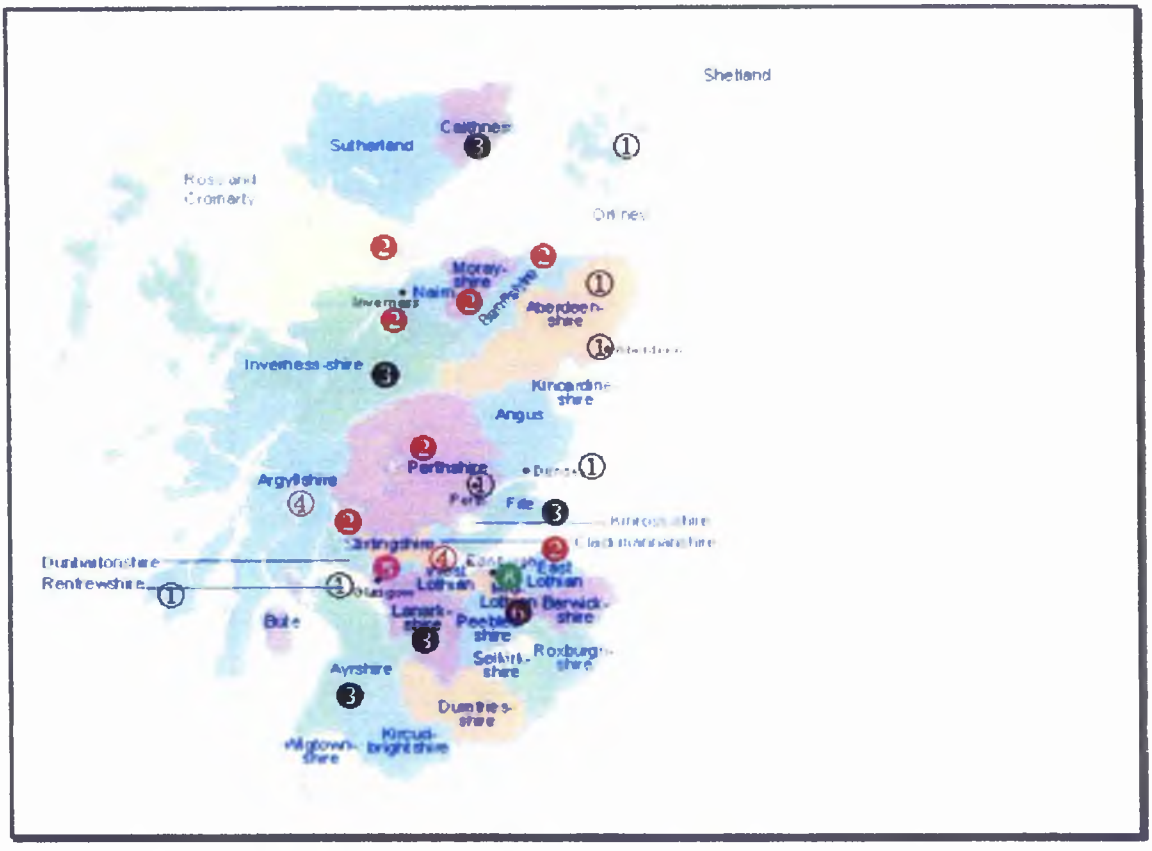
at start-up (Pearson's Chi-square 6.794, d.f.=1, P-value=0.009).[1] Indeed, there is evidence of path dependence between the share of sales attributed to manufacturing at start-up and the share attributed to manufacturing as a mature small firm. This finding explains the slow transfer of turnover from manufacturing to service based activities in mature manufacturing firms in the small firm sector. Enterprise Profile D in Volume II, Appendix 5 illustrates a sectoral shift from manufacturing to services. Sales of a bulk bag manufacturer were mainly in merchandising bulk bags, at the time of interview, as opposed to manufacturing of bulk bags, when the firm was founded.

The geographic scope of the sample was extensive as seen from Figure 5.1 above. Over half (57%) of the firms in the sample are from urban areas, over a quarter (27%) are from non-urban centres and a sixth (16%) are from the Highlands and Islands in Scotland.[2] Urban regional economics has sought to explain spatial patterns of entry and exit. Studies conducted in the UK suggest that small firms in rural areas experience more rapid growth rates than those in conurbations or remote rural areas [Keeble, 1993]. Certainly from Table 4.4, which presents the geographic scope of the stock of small medium sized firms in Scotland it is observable that a larger proportion of firms operate in urban centers such as Edinburgh and Glasgow. However, when the number of firms in each geographic region is standardised per resident adult over the age of sixteen then rural regions contain a larger relative stock of SBEs.

[1] McNemar's test for two related samples comparing the proportion of firms in manufacturing and services in their early years of trading with the proportion in manufacturing and services at the time of interview confirmed this result (N=63 two tailed P-value =0.824 using binominal distribution). There was no statistical difference found.

[2] Non-urban centres included firms firms located in Aberdeenshire (1 firms), Argyll (4 firms), Aryshire (3 firms), Banffshire (2 firms), Fife (3 firms), Perthshire (2 firms) and Morayshire (2 firms). Highlands and Islands comprise of firms operating from Inverness-shire (3 firms), Caithneas (3 firms), Isle of Skye (1 firm), Orkney (1 firm) and Rosshire (2 firms). Urban areas included Edinburgh (8 firms), West Lothian (4 firms), Midlothian (6 firms), East Lothian (2 firms), Glasgow (5 firms), Lanarkshire (3 firms), Dundee (1 firm), Aberdeen (1 firm), Perth (1 firm), Renfrewshire (1 firm), Inverness (2 firms) and Stirlingshire (2 firms).

Figure 5.1: Geographic Dispersion of Sample of Long-lived Small Firms



From the discussion above in general it can be said that the geographic scope of the sample is extensive. The sectoral composition of the sample is representative of the proportion of firms in extractive/manufacturing and services sectors in Scotland. There is some over sampling of small firms in light and heavy manufacturing but this is perhaps reflecting the composition of the sample frame and the slow progression of small firms in the Scottish economy from manufacturing to services activities. Evidence suggests that the firm's broad sectoral classification later in its life is dependent on this classification at start-up.

5.2.2 Age

The average age is about 26 years, (25 ½ years on average; median age is 22 years, roughly one generation) and no firm was younger than 10 years old. The maximum age in

the sample was 90 years (roughly three generations). Generational issues are of central importance, as the small firm grows older. This is discussed in Subsection 5.2.2.1 below. Age as proxy for the accumulated experience of the firm is considered in Subsection 5.2.2.2.

5.2.2.1 Generational Issues

Typically the long-lived small firm in this sample believed they were mature[3], and as many mature small firms are family businesses generational issues are important. After one generation, owner-managers are frequently looking for end games. A fairly obvious choice is family succession. Given generally favourable conditions in the labour market, and an increasing variety of job options, it turns out that family succession is by no means a foregone conclusion (Bachkaniwala *et al.,* 2001). For this reason the generational effect may have some impact on the lifecycle behaviour of the mature small firm.

While there has been little study of inter-generational effects using data on UK firms, evidence for small family firms in Italy suggest that issues surrounding family succession influence the likelihood of survival, as the small firm gets older. Lotti and Santarelli (2002) found that small family firms in Italy who had reached their thirtieth year in the market faced a higher risk of sudden exit. This result supports evidence from the U.S. (Lansberg, 1983; Beckhard and Dyer, 1983). Stoy Hayward's (1992) survey of family owned and non-family quoted companies in the United Kingdom, however, found that family companies were longer established than non-family companies. Westhead and Cowling (1998) explained that this higher family business survival rate in the U.K. is associated with the advantages of limited liability status coupled with slow growth rates in private firms permitting continued management by members of the founding family. Family succession is discussed further in Chapter 7, Subsection 7.51.

5.2.2.2 Learning

Partly the success of the SBE is attributable to the accumulated experience of the owner-manager by the practice of running the firm. Entrepreneurs initially ignorant of their

[3] Over three quarters (77.8%) firms stated that they were mature in that they had reached their desired size for a business of that type in terms of full-time equivalent employees and turnover. On average the mature small firms were 16.6 (16.12) years of age at maturity according to the owner-managers (with corresponding standard deviation in parentheses).

talents acquire information on their ability over time, revising their beliefs in light of market experience. Over time their ability is revealed at the same time as their skill is acquired (Jovanovic, 1982; Frank, 1988). This introduces time dependence into the performance growth relationship. The age of the SBE is a determinant of the firm's growth rate as well as its size. Age, in this instance, is a proxy for the accumulated level of experience of the owner-manager.

To explore how new firm founders learn their ability, Disney *et al.* (2002) compared the survival prospects of firms which were new ventures, with the survival prospects of new ventures by existing firms, who had a stock of know-how. They found that new ventures per se were less likely to survive than new ventures by existing firms. However Disney *et al.* (2002) found that size and growth mattered, by examining the consequences of switching the size growth features of new firms with those of existing firms. This does not refute learning arguments. Smith (1999) found that the owner-managers perceptions of their relative strengths indicated an immaturity of judgment close to business inception, suggesting entrepreneurial learning was indeed important. Initial stock of human capital (see Erikson, 2002; Bates, 1990) and learning by doing are key factors determining a firm's growth dynamics, to the extent that they enable new ventures to gain more resources at start-up, according to Mole (2002).

5.2.3 Firm Size

Many measures can be adopted to approximate the scale of the small firm (e.g. assets, turnover, fulltime equivalent employees, output etc). Turnover (in 2001 prices) and full-time equivalent employees are specifically examined here.

Turnover varied from 0 to £7.5 million pounds sterling with the average and standard deviation being £834,111stg. and £1,347,720stg. respectively. Diversification of the product portfolio aids the small firm accommodate fluctuating demand for individual products to maintain a steady level of turnover (see Ungern-Sternberg, 1990). The typical long-lived small firm produces or sells on average 10 (34.11) product (service) groups and 16,901 (125,891) products (services) to generate this turnover (associated standard deviations are in parentheses). The importance of product group size to survival has been emphasised by Reid (1993), ch.9 and is also confirmed in Chapter 8 of this thesis.

Turnover across principal product groups was diversified but not largely. More than 50% of turnover, on average, was raised from their main product group; 61.28% (23.66) of turnover was associated with the first most important product group, 22.32% (12.22) of turnover was associated with the second most important product group and 13.8% (10.35) was associated with the third most important product group (standard deviations are in parentheses). However products produced or supplied within different product groupings could accommodate to fluctuating demands.

Employment, as a measure of firm size, is less susceptible to variation. Relatively large small business enterprise, in terms of turnover, can have a relatively small workforce. The number of full-time equivalent (FTEs) employees varied from 1 to 130 with the average and mode being 13.55 and 6 respectively. In terms of firm size these mature small firms are on average just above the size of the micro-firm (less than 10 FTEs). Nearly two thirds (63%) of the 63 long-lived small firms had between 1 and 9 FTEs in 2001 (see Table 5.3). Approximately a fifth (17.4%) had between 10-19 FTEs and almost a tenth (9.5%) had between 20 and 49 FTEs. Thus few of these firms grew to become small medium sized enterprises, with 50 or more employees (6% percent of firms in the sample). The predominant firm type is still the micro-firm, the average firm size being somewhat raised by the existence of a few large firms in the sample.

From examining Table 5.3, one finds that the modal age was 10-19 years with 43 percent of firms in this class. It is important to note that little evidence exists of a relationship between the size, measured by FTEs, and age of the firm at the time of interview (Pearson's R= -0.033, P-value=0.796). There is evidence of a positive relationship between the size of the firm at start-up and the age of the firm at the time of interview (Pearson's R= 0.233, P-value=0.043). Thus only initial firm size is positively associated with the longevity of the small firm. This supports Geroski (1995) stylised result that the likelihood of survival is greater for larger firms than for smaller firms in their formative years, but not in the mature stage. At maturity, small firms can remain small, and face no disadvantage with respect to the likelihood of survival by occupying niche markets (see Agarwal and Audretsch, 1999).

Table 5.3: Number of Full-time Equivalent Employees by Age in 2001

		Number of Full-time Equivalent Employees				
		1-9	**10-19**	**20-49**	**50 +**	**Total**
Age	**10-19**	18	4	3	2	27
	20-29	10	6	1	2	19
	30-39	7	1	0	0	8
	40-49	1	0	4	0	5
	50-59	2	0	0	0	2
	60-100	2	0	0	0	2
	Total	40	11	8	4	63
	Start-up	*55*	*0*	*1*	*0*	*56*[a]

Notes: [a] *Data is available on FTEs at start-up for 56 firms due to changes in ownership of 7 firms in the sample.*

5.2.4 Organisational Form

There is general evidence of changes in the organisational form of small firms, from the sole proprietorship form, to the partnership and private limited company forms, over the lifetimes of the firms, (*cf.* Reid, 1998; Freedman and Godwin, 1992). Out of the sample of 63 long-lived small firms 1 (1.6%) was a sole trader operating from home, 15 (23.8%) were sole traders operating from business premises, 19 (30.2%) were partnerships and 25 (44.4%) were private limited companies. Eighteen (28.6%) of the owner-managers indicated that they changed the legal form of their firm during the life of the business.

A reason for a change in legal form, from sole trader or partnership forms to private limited company, is the "*apparent increased credibility, which the business has with both its customers and its bank*"; see Storey, (1994), p.140. Further it has been shown that limited companies achieve higher rates of growth (Hakim, 1989; Kalleberg and Leicht, 1991). However, according to Storey (1994) limited companies have higher failure rates and thus it is unwise to assume that the incorporated form is necessarily conducive to good management. Reid (1993, 1998) found that the extension of hierarchy in the organisational form of firm had a significant negative impact on profitability, suggesting agency costs arising from a loss of supervisory control implied by changes from sole proprietorships through to private companies.

Table 5.4 presents differences in the mean characteristics of long-lived small firms in the sample across organisational forms. Average age varied by business type but not significantly. There was a significant difference in the proportion of firms in

manufacturing across organisational forms (Pearson's Chi-square=16.818, 2d.f., $p<0.0001$.) Manufacturing firms tended to be private companies whereas service firms were more likely to be organised as a partnership or a sole proprietorship. Firm size, measured by full-time equivalent employees, varied considerably by type of business, as did firm size, approximated by turnover. Whether the business was a sole proprietorship, partnership or private company its level of full-time employment was on average 5.94 (5.85), 7.91(4.08) and 22.19 (27.69) and its turnover was on average £219,813 (£143,025), £557,526 (£455,994), and £1,372,821 (£1,885,391) respectively (with corresponding standard deviations in parentheses; turnover figures are in 2001 prices). A test of the null hypothesis of the equality of mean firm size (measured by FTEs and turnover) across organisational forms was rejected (p-value<0.01) using ANOVA indicating that private companies were larger than partnerships and sole proprietorships (see Table 5.4).

Labour productivity, which is a ratio of sales to full-time equivalent employees, for the last trading year, varied by business type, but not significantly. Given that there was no significant difference in labour productivity across organisational forms, there appear to be no gains in efficiency from limited liability status. Partnerships achieve a higher level of turnover per full time equivalent employee. This is to be expected, given the higher level of risk associated with this organisational form relative to sole proprietorships and private companies (i.e. partners are liable for each others actions).

Table 5.4: Mean Business Characteristics Across Organisational Forms

Variable	Organisational Form			Test Statistic	P-value
	Sole Proprietor *(n=16)*	Partnership *(n=19)*	Private Company *(n=28)*		
Age[b]	20.63	30.37	25.07	$F_{(2,60)}$ stat =1.729	P=0.186
	(9.77)	(18.86)	(15.72)		
Employees (FTEs)[a b]	5.94	7.24	22.18	$F_{(2,60)}$ stat=5.376	P=0.007
	(5.85)	(4.15)	(27.18)		
Turnover[a b]	219,812	557,526	1,372,821	$F_{(2,60)}$ stat =4.380	P=0.01
	(143,026)	(455,994)	(1,855,391)		
Labour Productivity[b]	55,032	72,339	64,425	$F_{(2,60)}$ stat =0.380	P=0.685
	(45,063)	(31,334)	(76,271)		
Manufacturing	2	3	18	Pearson's Chi-	P=0.0001
	(3.2%)	(4.8%)	(28.6%)	Square = 16.818	
Services	14	16	10	d.f.=2	
	(22.2%)	(25.4%)	(15.9%)		

Notes: [a]*Levenes test for homogeneity of variance was rejected in these cases*
[b]*Standard deviations are in parentheses*

5.2.5 Growth

Growth in size occurs over time, from period t to $t+\tau$ where $\tau = 1,2,3,....$ units of time (days, months, years etc.), if the scale of the small firm ($S_{t+\tau}$) in time period $t+\tau$ is greater than the scale of the firm (S_t) in time period t. A decline in growth occurred if $S_{t+\tau} < S_t$. The Law of Proportionate Effect (or Gibrat's Law) states that growth rates are independent of firm size and its past growth history. If it holds, all firm growth occurs at the same rate over an interval of time regardless of the initial size of the firm (see Sutton, 1997, 1998). Therefore the initial spread of firm sizes persists over-time.

There is conflicting evidence in support of Gibrat's law (see Section 3.2). Early work supported Gibrat's law (Hart and Prais; 1962; Simon and Bonini, 1958; Hymer and Pashigian, 1962), but subsequent empirical studies suggest a negative relationship between growth and size in the US (Mansfield, 1962; Hall 1987; Evans 1987a, b; Dunne *et al.*, 1989a) and in the UK (Dunne and Hughes, 1994; Hart and Oulton, 1996, 1998). Therefore in recent years it is somewhat accepted by small business economists that a negative relationship exists between growth and size (Reid, 1993). This is an early lifecycle effect. Reid (2001) concluded that this growth process stabilises over time and tends to a long run equilibrium value. This proposition is tested below in Subsection 5.2.5.4 but first trends in

measures of scale over time and across organisational forms are studied to aid interpretation.

5.2.5.1 Lifetime Trends in Size

Measures of the scale of the long-lived small firm at discrete intervals are presented in Table 5.5.[4] Significant differences were found in the mean levels of real turnover, full-time equivalent employees and labour productivity at different points in the lifecycle of the long-lived small firm.

The average full-time equivalent employment of long-lived small firms rose over their lives. An ANOVA test of the equality of mean full-time equivalent employees over time was rejected [$F_{(3,224)}$ statistic=5.53, P-value<0.001]. The dispersion of full-time equivalent employees increased threefold over the life of the firm. Levenes Test for the homogeneity of variances was rejected [Levenes $F_{(3,224)}$ Test statistic =7.069, p-value <0.0001]. Real turnover rose until the typical long-lived small firm was trading for ten years and then fell slightly after this point (i.e. it stabilised). An ANOVA test of the equality of mean turnover after the first year of trading, after 5 years of trading, after 10 years of trading and in 2001 was rejected [$F_{(3,191)}$ statistic =2.85, p-value=0.039]. The dispersion of real sales increased twofold over the life of the firm. Levenes Test for the homogeneity of variances was rejected [$F_{(3,191)}$ statistic=4.879, p-value=0.003].

Labour productivity, a ratio of real turnover to full-time equivalent employment, fell over the life of the firm as a natural consequence of the points above. Significant differences were also found across mean labour productivity.[5] The standard deviation of labour productivity fell by slightly more than a quarter over the life of the firm. Given that the dispersion of real sales and fulltime equivalent employees increased and the dispersion of labour productivity, a ratio of the two measures fell, adjustments in sales and employees towards an equilibrium level of labour productivity (or efficiency) were perhaps taking place.

[4] Different histories of firms are represented as the measure of scale relate to disparate starting points.
[5] An ANOVA test of the equality of mean levels of labour productivity yielded an $F_{(3,170)}$ statistic of 63.066 with p-value of 0.0001. Levenes Test $F_{(3, 170)}$ statistic of 44 was significant with a p-value of 0.0001.

Table 5.5: Scale of the Small Firm over its Lifecycle by Type of Business[a]

FTE Employees					
Time	N	At Start-up	After 5 years	After 10 years	Today
N[b]		56	54	55	63
Mean (Std dev.)		3.57 (5.45)	8.51 (11.27)	11.75 (15.32)	13.55 (19.89)
Sole Proprietor	12	1.83 (1.05)	4.54 (3.86)	4.83 (5.14)	3.92 (2.63)
Partnership	15	2.33 (1.58)	4.37 (3.64)	5.7 (3.49)	7.27 (4.40)
Private Company	19	5.61 (8.7)	14 (16.64)	19.68 (20.72)	17.76 (13.76)
Real Turnover (2001 prices)					
Time	N	After 1 year	After 5 years	After 10 years	2001
N		44	43	45	63
Mean (Std dev.)		269,449 (536,417)	630,866 (985,967)	888,099 (1,331,401)	834,111 (1,347,719)
Sole Proprietor	13	128,530 (99202.9)	269,989 (233,230)	257,661 (215,401)	209,769 (154,861)
Partnership	11	205,971 (176,037)	410,002 (336,219)	528,309 (459,987)	568,182 (459,909)
Private Company	19	403,627 (792,327)	1,005,651 (1,377,355)	1,536,774 (1,821,924)	1,485,474 (1,600,349)
Labour Productivity					
Time	N	After 1 year	After 5 years	After 10 years	2001
N		44	42	44	63
Mean (Std dev.)		89,114 (88,997)	76,206 (56,441)	75,334 (63,279)	64,427 (57,893)
Sole Proprietor	10	95,418 (118,740)	74,478 (61,392)	69,963 (50,025)	61,245 (52,050)
Partnership	10	107,401 (90,842)	99,714 (62,493)	98,731 (72,110)	74,395 (34,558)
Private Company	15	77,689 (82,158)	74,323 (56,786)	76,041 (77,939)	80,932 (100,864)

Notes: [a]*Standard deviations are in parentheses*

[b]*N varies because of changes in ownership (7 cases) and because some firms found it difficult to recall the required information at points earlier in their life.*

It is difficult to examine trends using aggregate data given the heterogeneity of the firms across organisational forms (see Subsection 5.2.4). Thus, it is more satisfactory to examine trends across business types (sole proprietors, partnerships and private companies).

5.2.5.2 Trends in Size Over life of Small Firm by Organisational Form

The mean firm size as measured by both full-time equivalent employees, and real turnover of all organisational forms, rose until the small firms ten-year birthday. After this point, on average, sole proprietors and private companies downsized. Average full-time equivalent employees and real turnover, of firms of partnership form, continued to rise after this point.

Mean labour productivity fell over the life of sole proprietors and partnerships. It suggests that these organisational forms do not foster the sustaining of high levels of productivity achieved at start-up. Labour productivity rises over the life of private companies. However, private companies never achieve the high levels of mean labour productivity of partnerships attained in the first ten years of trading. Similar patterns are found if percentage changes in these measures by business type from t to $t+\tau$ are examined (see Table 5.6). From an examination of these percentages it is clear that most of the adjustment in the scale occurred over the first five years of trading. Small firms are experiencing a lot of growth in these early years of trading as compared with any other period of their development. This finding is compatible with the results of estimations of Gibrat's Law over the lifecycle examined in the next Subsection.

Table 5.6: Annual Percentage Change in Scale of the Small Firm over the Lifecycle by Type of Business[a]

FTE Employees			
Time	Over first 5 years	Over first 10 years	Lifetime[b]
N	54	55	56
% Change (Std dev.)	43% (59)	41% (77)	26% (50)
Sole Proprietor	32% (40)	16% (17)	7% (8)
Partnership	32% (53)	24% (28)	20% (28)
Private Company	57% (70)	67% (108)	41% (70)
Real Turnover (2001 prices)			
Time	Over first 5 years	Over first 10 years	Lifetime[b]
N	43	44	44
% Change (Std dev.)	60% (86)	41% (54)	29% (46)
Sole Proprietor	30% (38)	15% (19)	8% (14)
Partnership	30% (30)	25% (23)	25% (37)
Private Company	98% (115)	68% (70)	46% (58)
Labour Productivity			
Time	Over first 5 years	Over first 10 years	Lifetime[b]
N	43	42	44
% Change (Std dev.)	12% (38)	3% (10)	2% (9)
Sole Proprietor	6% (18)	2% (9)	1% (6)
Partnership	5% (16)	3% (13)	2% (11)
Private Company	19% (53)	3% (10)	3% (9)

Notes: [a]*Standard deviations are in parentheses*
[b]*Corresponds to different life histories*

5.2.5.3 A Test of Gibrat's Law Over the Life of the Long-lived Small Firm

Reid (2001) found evidence to refute Gibrat's Law using the following specification of Gibrat's classical model which assumes an endogenous effect of size on growth:

$$S_{t+\tau}/S_t=\gamma S_t^{(\beta-1)} \quad (5.1)$$

where S is size and γ is the exogenous deterministic effect (the market growth rate). When $\beta=1$, the Gibrat case, occurs and equation (5.1) collapses to equation (5.2)

$$S_{t+\tau}/S_t=\gamma \quad (5.2)$$

In this instance, all small firms expand at a common growth rate, the market rate γ (i.e. no endogenous effect). Then, growth is independent of firm size (see Sutton, 1997, 1998). When $\beta>1$ larger small firms have higher growth rates than smaller ones. When $\beta<1$ smaller small firms have higher growth rates than larger small firms. Equation (5.1) can be extended by multiplying it by an independently distributed positive random variable $u_t>0$ giving:

$$S_{t+\tau}/S_t=\gamma S_t^{(\beta-1)}\, u_t \quad (5.3)$$

Equation (5.3) is expressed in log-linear form for ease of estimation as follows:

$$\text{Ln } S_{t+\tau}=\text{Ln } \gamma+\beta\text{Ln } S_t+\text{Ln } u_t \quad (5.4)$$

or

$$s_{t+\tau}=\alpha+\beta s_t+\varepsilon_t \quad (5.5)$$

where $\text{Ln } S_{t+\tau}=s_{t+\tau}$, $\text{Ln } \gamma=\alpha$, $\text{Ln } S_t=s_t$ and $\text{Ln } u_t=\varepsilon_t$

Equation (5.5) is estimated as

$$s^e_{t+\tau}=a+bs_t \quad (5.6)$$

where e denotes the expected value of the dependent variable and (a,b) are regression estimates of (α,β). Equation (5.6) is an expression for the first order linear difference equation for which the stability condition is $0< b <1$. If this condition holds then the sequence s_t converges to an equilibrium value of s^*. Equilibrium is achieved when

$$s^e_{t+\tau}=s_t=s^*=a/(1-b) \quad (5.7)$$

In refuting Gibrat's Law, Reid (2001) estimated equation (5.5) using data on 150 Scottish small firms early in their lifecycle over a one year time period (1994-1995) and over a

three-year period, (1994-1997). Here, tests of Gibrat's Law over longer time intervals, and at different points in the life cycle, are conducted.

The ordinary least squares estimates of equation (5.5) were obtained for values of $s_{t+\tau}$ and s_t using different measures of scale (reflated to 2001 prices where appropriate).[6] Three measures of scale were examined, the natural logarithm of full-time equivalent employees (*Lempx)*, natural logarithm of real sales turnover (*Lsalesx*) and the natural logarithm of labour productivity (*Lprodx)*, where 'x' represents different points in the lifecycle '*st*' for inception, '*5yr*' for after 5 years of trading, '*10yr*' for after 10 years of trading and '*01*' for the year 2001. Summary measures of these variables are provided in Table 5.7 and the results of the least squares estimations are presented in Table 5.8. These models are estimated for surviving firms, as data is not available on the trajectory of these scale measures for non-survivors.[7]

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[6]An adjustment for heterscedasticity was undertaken using White's heteroskedastic consistent covariance matrix.

[7] A quick test demonstrated that sample selectivity bias did not have an appreciable effect on the results. There are some rudimentary data available on sales and employment on survivors and non-survivors. This data was gathered on the three parent samples when they were interviewed originally. A probit model of the form $I=X\beta$ where I is an index for survival in 2001 taking on the value of '1' for survivors and '0' otherwise was estimated with log of employment (or sales or labour productivity where appropriate) as the independent variable. The inverse mills ratio (IMR) was computed and used as an additional regressor in the employment regression, estimation C, in Table 5.8. It produced the following results:

Independent Variable	*Coeff.(b)*	*T test on b*
Lempst	0.433	2.19
IMR	-7.039	-0.60
Constant	9.952	0.72

Similarly in sales regression estimation I

Independent Variable	*Coeff.(b)*	*T test on b*
Lsales1yr	0.599	5.03
IMR	-0.562	-0.62
Constant	6.555	3.42

and the labour productivity estimation O

Independent Variable	*Coeff.(b)*	*T test on b*
Lprod1yr	0.356	1.68
IMR	-2.631	-0.75
Constant	10.244	1.97

In each case the coefficient on mills ratio (IMR) was not significant indicating that sample selectivity bias is not an issue of concern.

Table 5.7: Summary Measures of Variables for Estimations of Gibrat's Model

Variable	N	Mean	Std. Dev	Min.	Max.
Lemp'01	63	2.051	1.017	0	4.868
Lempst	56	0.894	0.790	0	3.689
Lemp5yr	54	1.719	0.867	0	4.248
Lemp10yr	55	1.953	0.989	0	4.533
Lsales'01	62	12.91	1.167	10.78	15.83
Lsales1yr	44	11.78	1.176	9.295	15.07
Lsales5yr	43	12.75	1.037	11.04	15.58
Lsales10yr	45	12.93	1.220	10.92	15.76
Lprod'01	62	10.86	0.652	9.21	12.94
Lprod1yr	44	10.96	0.985	8.60	12.93
Lprod5yr	42	10.99	0.711	9.582	12.31
Lprod10yr	44	10.92	0.825	9.000	12.55

Table 5.8: Test of Law of Proportionate Effect

Estimations	Dependent Variable	Independent Variable	Coeff. (b)	a (constant)	T test (b=0)	F test (R^2=0)	N	R^2	F-test (b=1)	s_t*	S_t*
A	Lemp5yr	Lempst	0.646	1.147	5.28*	27.89*	54	0.33	8.35*	3.2420	26
B	Lemp10yr	Lempst	0.529	1.493	3.15*	9.90*	55	0.17	7.88*	3.1661	24
C	Lemp'01	Lempst	0.401	1.650	2.41**	5.82*	56	0.1	13.01**	2.7535	16
D	Lemp10yr	Lemp5yr	0.985	0.250	13.12*	172.05*	54	0.73	0.04		
E	Lemp'01	Lemp5yr	0.792	0.635	8.36*	69.84*	54	0.47	4.79**	3.0607	21
F	Lemp'01	Lemp10yr	0.867	0.315	13.44*	180.67*	55	0.74	4.29**	2.3588	11
G	Lsales5yr	Lsales1yr	0.602	5.663	5.95*	35.41*	43	0.47	15.5*	14.2205	1,499K
H	Lsales10yr	Lsales1yr	0.713	4.563	7.64*	58.43*	44	0.48	9.49*	15.8879	7,943K
I	Lsales'01	Lsales1yr	0.613	5.801	5.45*	29.67*	43	0.39	11.84*	14.9855	3,222K
J	Lsales10yr	Lsales5yr	1.050	-0.452	21.11*	445.76*	43	0.80	1.02		
K	Lsales'01	Lsales5yr	0.886	1.674	8.17*	66.71*	42	0.61	1.10		
L	Lsales'01	Lsales10yr	0.891	1.427	11.73*	137.63*	44	0.8	2.07		
M	Lprod5yr	Lprod1yr	0.327	7.413	3.09*	9.58*	42	0.2	40.54*	11.02	60K
N	Lprod10yr	Lprod1yr	0.520	5.210	7.36*	54.2*	43	0.37	46.36*	10.84	51K
O	Lprod'01	Lprod1yr	0.422	6.306	5.65*	33.91*	43	0.34	60.01*	10.90	54K
P	Lprod10yr	Lprod5yr	0.840	1.673	5.8*	33.67*	42	0.51	1.24		
Q	Lprod'01	Lprod5yr	0.540	4.972	3.89*	15.15*	41	0.30	11*	10.81	49K
R	Lprod'01	Lprod10yr	0.666	3.655	6.48*	42.03*	43	0.62	10.57*	10.94	56K

Notes:

*a) * p-value =0.01, **p-value=0.05*

b) The R^2 ranges from 0.1 to 0.8 (at values above 0.3 in most cases) and the F-values are highly significant (at p=0.0001 in the majority of cases). The performance of the estimations improves the shorter the time period between the explanatory variable and the regressor.

c) Values for s_t(natural logarithm) and S_t*(absolute values) are not presented for estimations D, J, K, L, P because an F test of the null hypothesis b=1 could not be rejected implying that the growth process is unstable (i.e. does not tend to an equilibrium value).*

The null hypothesis of H_0: b=1 (see Table 5.8) is clearly rejected when the natural logarithm of firm size at start-up (after 1 year of trading where relevant) is regressed on the natural logarithm of size later in the firm's lifecycle (after 5yrs, 10yrs etc.) when size is approximated by real turnover, full-time equivalent employees or labour productivity. The coefficient b may be judged to be less than unity. Gibrat's Law is refuted which suggests a stable process of adjustment in small firm size early in the small firm's lifecycle. However this result is less convincing particularly for real turnover when the natural logarithm of this variable after five years of trading or after ten years of trading are used as regressors in explaining variation in the natural logarithm of turnover in 2001. The null hypothesis of H_0: b=1 cannot be rejected in these instances (see estimations J-K in Table 5.8). It seems Gibrat's Law is supported once real turnover reaches an equilibrium level. Thus smaller SBEs enjoy relatively greater growth prospects in real turnover in the early years of trading, but grow at the market rate once growth in turnover reaches a certain level. There is evidence of support for Gibrat's Law between year five and year ten for full-time equivalent employees and labour productivity (see estimations D and P). The null hypothesis of H_0: b=1 could not be rejected in these cases, but not in any other case. Slope coefficients, b, for regressions using full-time equivalent employees and labour productivity are approaching 1 in comparison with their values when *Lempst* (see estimations A-C) and *Lprod1yr* (see estimations M-O) are used as regressors particularly for shorter adjustment periods. Indeed, the small firm has a greater ability to adjust FTEs and Labour productivity as opposed to real turnover, later in the firm's lifecycle. This is only the case over longer time intervals.

5.2.5.4 Changes in Adjustment Paths

Large changes in the slope coefficient b over the life of the firm (over 5 years, 10 years or the life of the firm to date) for any scale measure indicate a change in the adjustment path of the scale of the firm. This subsection formally tests for changes in the slope coefficient over the life of the firm, and illustrates these shifts using phase diagrams.

Reid (2001) proposed a formal test for changes in the adjustment path. For example, a change in the adjustment path between estimations (A) and (C) reproduced here as regression equations (5.8) and (5.9) is conducted using an F Test of the null hypothesis

that the slope coefficient of equation (5.8), 0.646, is equal to 0.401, the slope coefficient of equation (5.9).

$$\text{Lemp5yr} = 1.147 + 0.646\text{Lempst} \quad (5.8)$$

$$\text{Lemp'01} = 1.650 + 0.401\ \text{Lempst} \quad (5.9)$$

In this particular case the Ho: b_{II}=0.401 was rejected (F statistic = 4.08, P-value <0.05). Thus there was a change in the adjustment process of full-time equivalent employee growth over the first five years of trading, and over the life of the firm to date (i.e. the point of inception to 2001). The adjustment processes represented by coefficient b in equations (5.8) and (5.9) are distinct.

The results of similar tests at different points in the lifecycle are presented in Table 5.9. The final column of this table tests the null hypothesis that growth process I and II are identical (Ho:$b_I = b_{II}$). A comparison of the results of Tables 5.8 and 5.9 shows that adjustment paths seem to be distinct, when comparing growth rates over the first five years of trading (estimates A, G and M), to those growth paths which support Gibrat's Law (D, J, and P, respectively). This shows a change in the growth path from one in which smaller small firms grew faster than larger small firms, to one in which all firms grow at the market rate. This supports evidence presented in Tables 5.6, that most of the growth in scale occurred over the first five years of trading. When comparing the growth path in FTEs over 5 year periods (estimates A and D), to growth paths over longer periods (estimates C and E, respectively) the null hypothesis, that the growth paths are equivalent, is rejected also. Thus the longer the time period, the greater is the ability of the small firm to adjust its headcount.

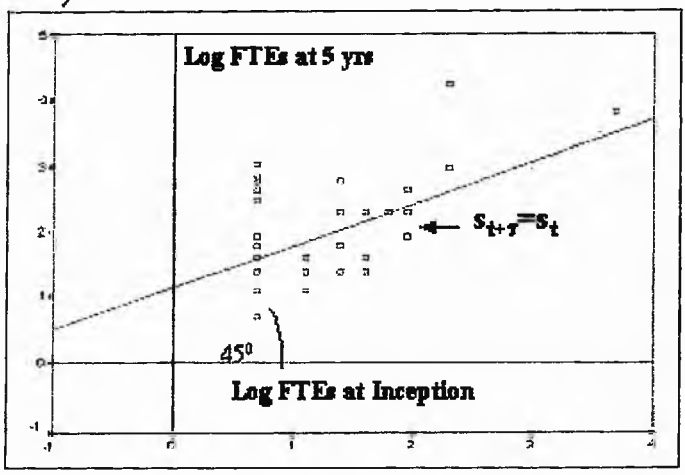
A phase diagram is a means of representing the dynamics of equation (5.5) with $s_{t+\tau}$ on the vertical axis and s_t on the horizontal axis. The equilibrium set of points is then represented by the 45^0 line where $s_{t+\tau} = s_t\ \forall t$ (i.e. b=1). If b<1 then the sequence s_t converges to an equilibrium value of $s^*=a/(1-b)$. The equilibrium values are provided in Table 5.8, expressed in terms of both the natural logarithm, s*, and in absolute values, S*. The latter are calculated by taking the exponential value of s*. Phase diagrams are presented in Figures 5.2 to 5.4, for data on full-time equivalent employees, real turnover and labour productivity, respectively.

Table 5.9: Test of Change in Adjustment Paths

Growth Path Period I				Growth Path Period II				Test of Equivalence	
Estimation	**Dependent Variable**	**Independent Variable**	**Coeff. (b_I)**	**Estimation**	**Dependent Variable**	**Independent Variable**	**Coeff. (b_{II})**	**F-test $b_I = b_{II}$**	**Judgement**
A	Lemp5yr	Lempst	0.646	B	Lemp10yr	Lempst	0.529	0.53	Not distinct
				D	Lemp10yr	Lemp5yr	0.985	7.66*	Distinct
				C	Lemp'01	Lempst	0.401	4.02**	Distinct
D	Lemp10yr	Lemp5yr	0.985	E	Lemp'01	Lemp5yr	0.792	6.58**	Distinct
G	Lsales5yr	Lsales1yr	0.602	H	Lsales10yr	Lsales1yr	0.713	1.2	Not distinct
				J	Lsales10yr	Lsales5yr	1.050	19.66*	Distinct
				I	Lsales'01	Lsales1yr	0.613	0.01	Not distinct
J	Lsales10yr	Lsales5yr	1.050	K	Lsales'01	Lsales5yr	0.886	10.86*	Distinct
M	Lprod5yr	Lprod1yr	0.327	N	Lprod10yr	Lprod1yr	0.520	3.31***	Distinct
				P	Lprod10yr	Lprod5yr	0.840	23.47*	Distinct
				O	Lprod'01	Lprod1yr	0.422	0.8	Not distinct
P	Lprod10yr	Lprod5yr	0.840	Q	Lprod'01	Lprod5yr	0.540	4.28**	Distinct

Note: *p-value =0.01, **p-value =0.05, ***p-value=0.

a)


Log FTEs at 5 yrs
$S_{t+7}=S_t$
45⁰
Log FTEs at Inception

b)

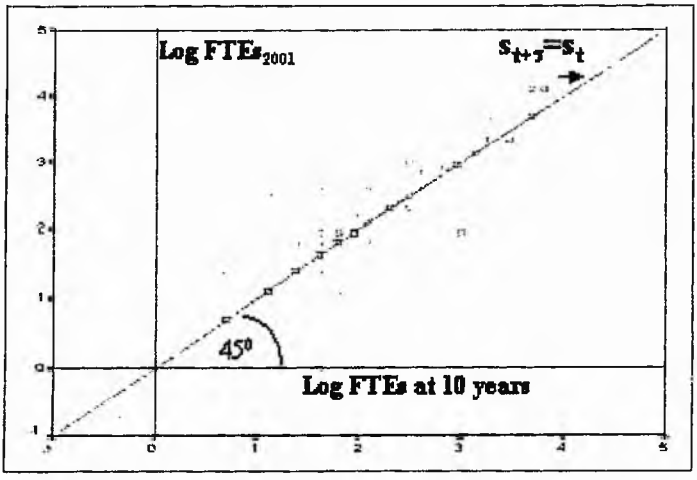
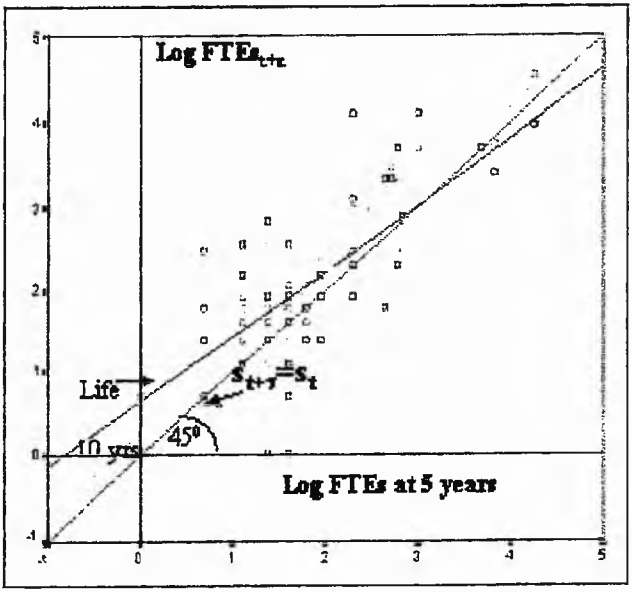

Log FTEs2001
$S_{t+7}=S_t$
45⁰
Log FTEs at 10 years

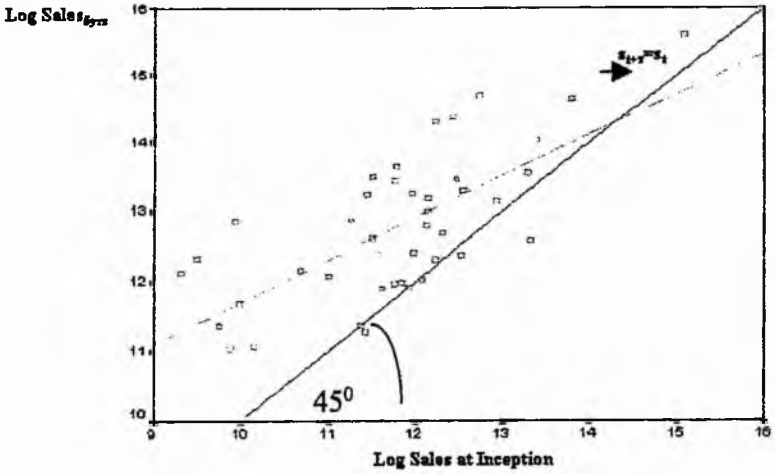
Figure 5.2

Phase Diagrams of FTEs

c)



a)


Log Sales$_{8yrs}$
$S_{t+3}=S_t$
45^0
Log Sales at Inception

b)

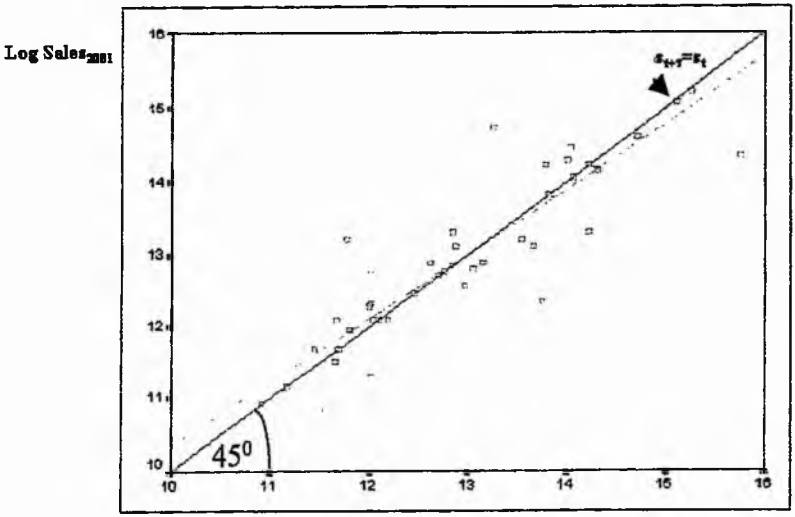

Log Sales$_{2001}$
$S_{t+3}=S_t$
45^0
Log Sales at 10 years

Figure 5.3

Phase Diagrams of Real Turnover

c)

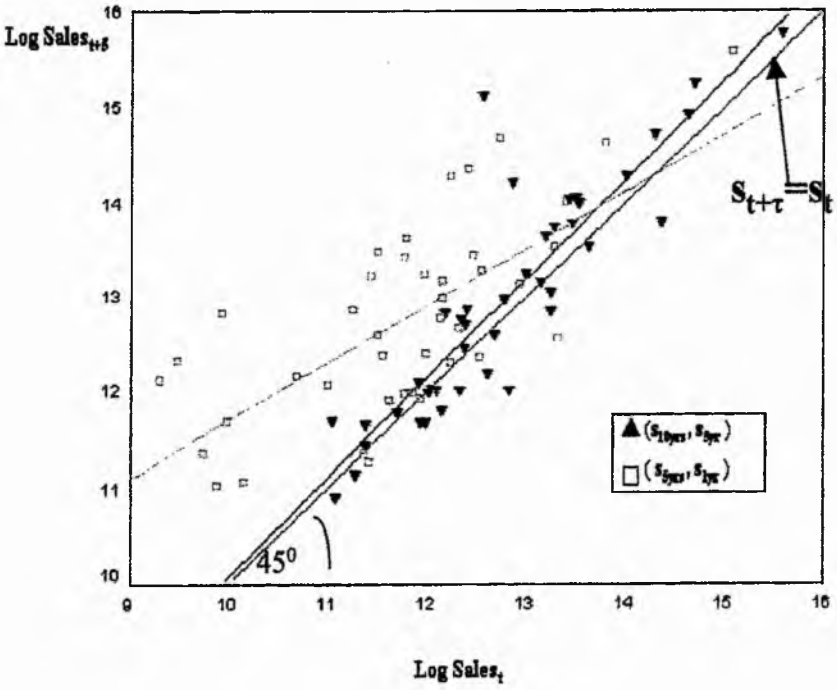
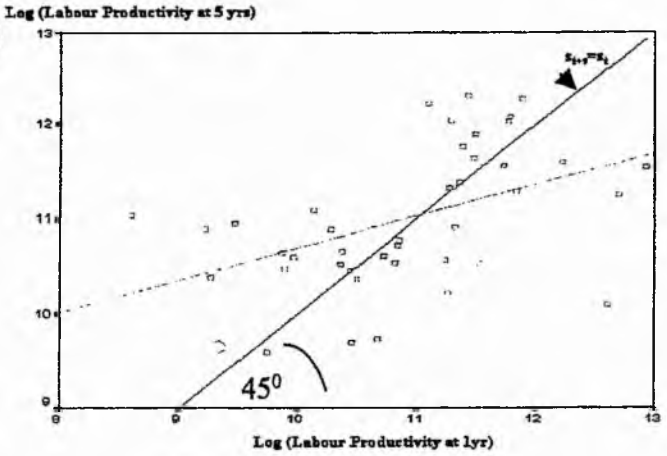


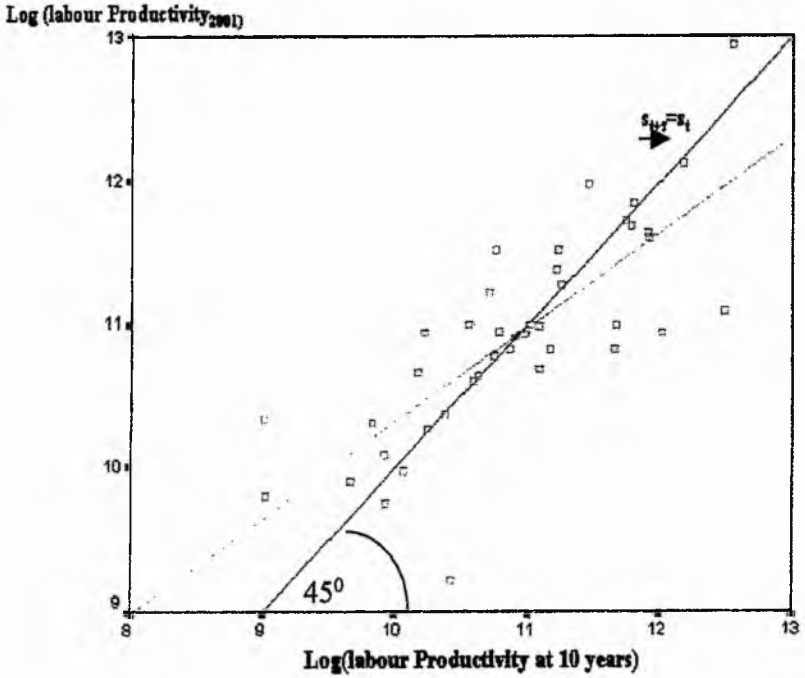
Figure 5.4

Phase Diagrams of Labour Productivity

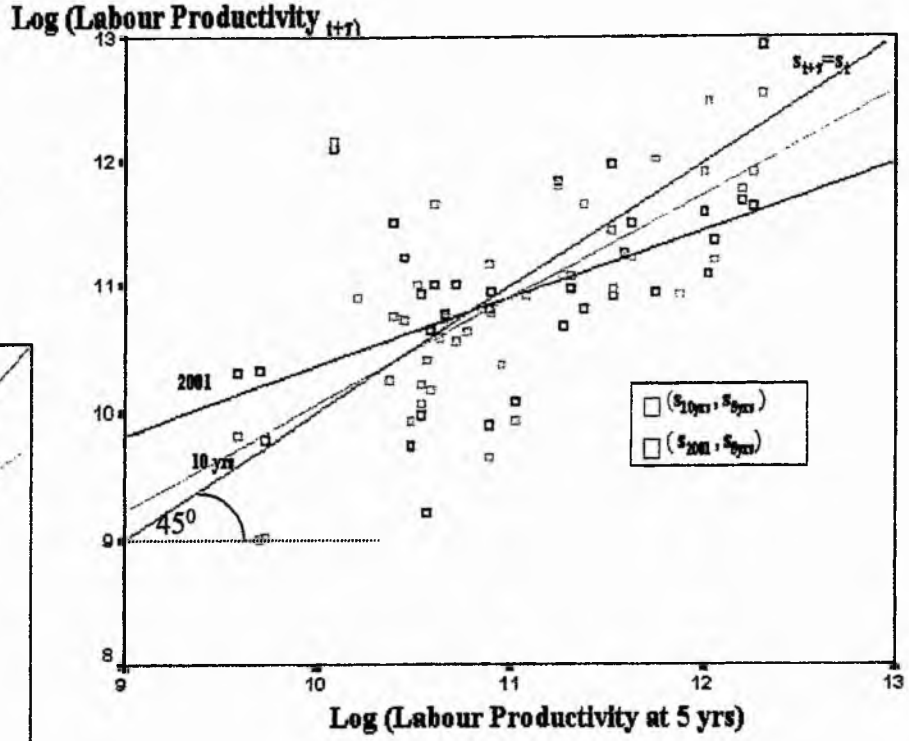
a)



b)



c)



It is evident from Figure 5.2 that there is shift in the adjustment path of FTEs after the first 5 years of trading. The regression line for estimation A is further apart from that 45^0 line (see Figure 5.2a) where b=1, $s_t = s_{t+\tau}$, in comparison with the regression line of estimation F (see Figure 5.2b). A similar argument can be made with respect to regression line of D and E in Figure 5.2c. Certainly these phase diagrams suggest that there is evidence to support Gibrat's Law after the first five years of trading. The equilibrium value for FTEs in levels, S_t^*, fell over time, from approximately 26 (3.242) after 5 years of trading, to 24 (3.1661) after 10 years of trading, and to 16 (2.7535) in 2001 (natural logarithm values, s_t^*, are in parentheses). Firms are adjusting in their approach to these equilibrium values. Thus there is some learning here, as small firms revise their expectations of employment growth downwards over time. Chapter 9 explores this further, and explains adjustments downwards in size in terms of a 'size/performance' trade-off.

With respect to real turnover, Figure 5.3b and Figure 5.3c illustrate support for Gibrat's Law after 5 years of trading. The regression lines approach that of the 45^0 line, where $s_t = s_{t+\tau}$. The equilibrium value for sales in levels, S_t^*, increased from approximately £1.5m (14.2) after five years of trading, to £8m (15.9) after 10 years; but fell to £3m (15) when examining sales growth over the life of the firm to date. The associated natural logarithm values, s_t^*, are in parentheses. In this instance, the small firm also revises its expectations of sales growth downwards. Labour productivity, as seen from Figure 5.4, is much more stable, and tends to an equilibrium value, between forty-nine (10.8) and sixty thousand (11), early in the life of the firm. It remains stable at this level, throughout its life. This suggests that full-time equivalent employees are adjusting to maintain an equilibrium level of efficiency, since, as the firm grows older, real turnover grows at the market rate.

In summary, Gibrat's Law is rejected, suggesting a stable process of adjustment in small firm size in the early years of trading. This supports Reid's (2001) findings that the growth process stabilises over time, and tends to a long run equilibrium value. This evidence of an early lifecycle effect is evident for all three measures of scale. However, after five years of trading, there is evidence in support for Gibrat's Law, at least in the case of real turnover, where real turnover essentially grows at the market rate, after a certain point in the growth path of the firm. This finding was confirmed through the statistical

analysis of adjustments in growth paths, and also visually, using phase diagrams. It supports Jovanovic's (1982) proposition that firm growth is independent of size for mature firms.

5.2.4 Conclusions

The discussion showed that, while entrepreneurial learning is important in promoting the longevity of the small firm, initial size conditions have a larger effect. There is weak association between the age of the firm and its initial firm size. The size of the typical small firm has not generally grown over time. The predominant firm type is still the micro firm. There are few "gazelles" in the sample. Thus there seems to be a tendency for small firms to remain small. These firms can remain small and survive over the long haul. Small size may not be a disadvantage in some market niches (see Agarwal and Audretsch, 1999). FTEs and turnover differ significantly across business types. Partnerships are the most efficient form, in terms of labour productivity. The level of productivity of private companies never achieves the level of productivity of partnerships.

There is little evidence for displacement of employment over time in terms of aggregate full-time equivalent employees. Yet there is some, when one looks at headcount across organisational forms (e.g. in sole proprietorships and private companies). Real turnover also falls, after the first ten years of trading in sole proprietorships and private companies, while labour productivity falls over the life of sole proprietorships and partnerships, but rises over the life of private companies. Despite an initial burst of growth in the early years of trading (over the first five years) there is some evidence of adjustment downwards in scale as the firm matures. Perhaps a size performance trade-off exists, (see Chapter 9).

In tests of Gibrat's Law there was evidence of an early lifecycle effect. Thus smaller small firms grew faster than larger small firms (i.e. Gibrat's Law was rejected). However, in estimates which exclude the first five-year period, there is evidence in support of Gibrat's Law, particularly when real turnover is the size variable. In fact, there is evidence of a shift in the growth path for the first five years of trading, and the next five years, where scale grows approximately at the market rate. This evidence presents a new insight on empirical tests of Gibrat's Law. It seems that is important to consider different

points in the lifecycle of the firm in testing Gibrat's Law. Evidence which refutes Gibrat's Law, at least in the case of real turnover, may be capturing an early lifecycle effect. If examined later in the small firm's life evidence to support Gibrat's Law may be found. The evidence supports Jovanovic's (1982) theory which rejects Gibrat's Law for young firms but suggests that firm growth rates may be independent of size among mature firms. Equilibrium levels of labour productivity are relatively stable (between 49K-60K) suggesting that the long-lived small firm is adjusting headcount to maintain efficiency. This also suggests a size/efficiency or performance trade-off, (see Chapter 9).

5.3 Market Characteristics

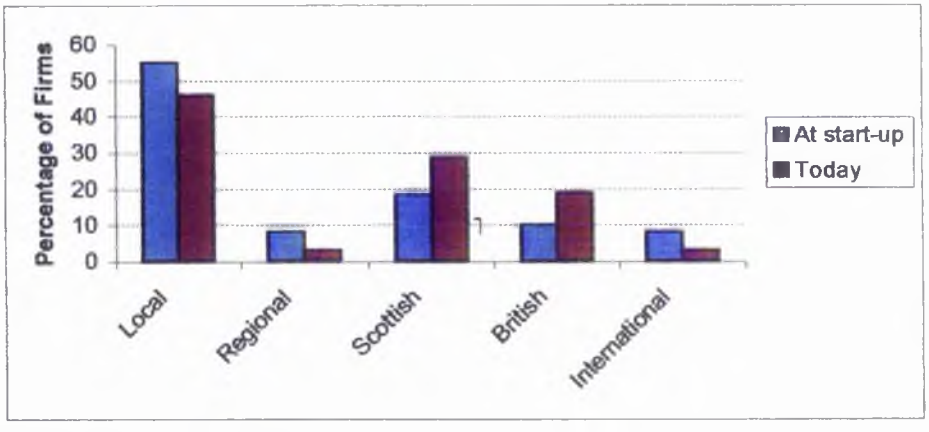
Covin and Slevin (1989) argue that the nature of the market into which the firm sells is a key influence on potential growth. They distinguish between what they term 'hostile' and 'benign' environments. In hostile environments, the firm is threatened by vigourous and intense interactions with competitors (Miller and Friesen, 1983). The failure rate of companies in hostile environments tends to be high, and competitive intensity is often severe, and exacerbated by price wars and minimal customer loyalty. Not surprisingly, profit margins are characteristically low among firms in these environments (Potter, 1994).

Benign environments have characteristics opposite to those of hostile environments (see Covin *et al.,* 1999). In particular, according to Covin *et al,* (1999), benign environments are munificent settings, characterised by relatively high profit margins, low competitive intensity, high customer loyalty and a general tolerance for poor managerial decisions, by industry and market forces alike. The failure rate in benign environments tends to be relatively low. Product based competition is pervasive, as opposed to price competition. *A live and let live* philosophy characterises the competition (see Reid, Jacobsen and Andersen, 1993). This Section analyses the geographic scope of the main market and the extent of competition. It forms an assessment of the hostility of the competitive environment for the typical long-lived small firm.

5.3.1 Market Extent

Almost half (46%) of long-lived small firms in the sample served local markets. The other half (54%) supplied markets with a wider geographical reach. Less than five percent (3.2%) served regional markets, almost a third (28.6%) supplied the Scottish market and a fifth (19%) supplied the UK market. Less than five percent (3.2%) served international markets. Almost half (47.6%) the mature small firms stated that their main market had changed since start-up. Typically they expanded their 'market reach' in the sense of moving from e.g. local to U.K. market. Figure 5.5 shows the percentage of firms operating in different markets at start-up and 2001. In general there was a decrease in the proportion of firms supplying local and regional markets and an increase in the proportion supplying the Scottish and UK market. This implies a general increase of 'market reach' over the lifecycle, but not a spectacular increase. A test of the null hypothesis of equality between the mean ranked market reach at start-up and mean ranked market reach in 2001 was rejected using Wilcoxon Signed Rank Test (Z statistic=-1.747, p-value=0.0405<0.05; see Table 5.10 below).

Figure 5.5: Market Reach



Note: Today represents the year 2001

There is also evidence that the geographic scope of the small firm's main market at start-up was dependent on the geographic scope of its main market at the time of interview (Pearson's Chi-square=40.227 with d.f.=16, p-value<0.001). This supports Reid's (2001)

findings for a sample of 150 Scottish small business start-ups. He found that unless firms start with ambitious marketing intentions, which aim at national or international markets, the odds are against their working their way up to these wider markets, even over longer periods of time.

Table 5.10: Tests for Change in Features of the Small Firm's Market

Characteristic	Ranks	N	Mean Rank	Sign Test	Wilcoxon Signed Ranks Test
Main market	+	11	10.73	-0.77	-1.747[a]
	-	16	16.25	0.441	(0.081)
	Ties	33			
	N	60			
Market share	+	6	8.25	0.015[c]	-3.095[a]
	-	19	14.50		(0.002)
	Ties	27			
	N	52			
Level of differentiation	+	4	7.00	0.754[c]	-0.054[b]
	-	6	4.50		(0.957)
	Ties	51			
	N	61			
Market positioning	+	4	6.50	0.019[c]	-2.863[a]
	-	15	10.93		(0.004)
	Ties	42			
	N	61			
Description of competition	+	27	16.59	-3.712	-3.888[b]
	-	5	16.00	(0.000)	(0.000)
	Ties	21			
	N	53			

Notes
a Based on positive ranks
b Based on negative ranks
c Binomial distribution used

Larger main markets offer the prospect of growth with economies of scale (Reid, 1994, 1998). Certainly from Table 5.11 there is evidence of a positive relationship between size (approximated by FTEs and real turnover) and the geographical scope of the market (at start-up and 2001). There was a significant difference in the mean size of the firm, approximated by turnover [$F_{(4, 55)}$ statistic = 11.685, p-value <0.0001] and FTEs [$F_{(4, 55)}$ statistic = 7.14, p-value <0.0001], at the time of interview, for long-lived small firms who served different geographical markets at start-up. However only size approximated by turnover in 2001 differed significantly across firms serving different geographical markets in 2001 [$F_{(4, 58)}$ statistic = 3.18 at a p-value of 0.02]. These are exploratory results. A more systematic treatment involving the joint determination of size, main market and

performance, is analysed in a simultaneous equations system in Chapter 9. While larger markets present growth opportunities, the small firm may face greater competitive pressure as its ambitions, in the same increase (Penrose, 1959). An assessment of the hostility of the competitive environment of the typical long-lived small firm is formed below.

Table 5.11: Pearson's Product Moment Correlation between Geographic scope of the Market and Firm Size

			Main Market	
			Start-Up	2001
Main Market	Start-Up	Pearson Correlation	1	
		Sig. (1-tailed)	.	
		N	60	
	2001	Pearson Correlation	.569	1
		Sig. (1-tailed)	*.000*	.
		N	60	63
FTEs	Startup	Pearson Correlation	.544	.368
		Sig. (1-tailed)	*.000*	*.002*
		N	60	63
	2001	Pearson Correlation	.409	.314
		Sig. (1-tailed)	*.001*	*.006*
		N	60	63
Real Turnover	After 1 year	Pearson Correlation	.225	.299
		Sig. (1-tailed)	*.076*	*.024*
		N	42	44
	2001	Pearson Correlation	.151	.270
		Sig. (1-tailed)	*.140*	*.022*
		N	53	56

5.3.2 Competitive Environment

Mature markets often take on hostile characteristics (like 'trade stealing'), unlike growing markets, which often have benign attributes (like affirmative or 'good' rivalry). Since the small firms in this study are mature, it is likely that the markets in which they operate are also mature, and indeed hostile. Product differentiation was observed by Miller (1987) as a means by which firms in hostile environments sometimes compete, to cope with hostility. It is likely that the long-lived small firms in this sample have survived by pursuing such a strategy. The hostility of the principal market of the long-lived small firm is explored next, through an examination of rivalry, niche plays, and the role of excess capacity.

5.3.2.1 Rivalry

Classifying markets as benign or hostile is difficult. Empirically, studies which have used a measure of hostility (or intensity of competition), have tended to focus upon the number of direct competitors or rivals of the small firm (Storey, 1994). Though compatible with the concept of perfect competition, it is not clear that competition is monotonically increasing in the number of firms serving the market-place. For example, the markets which a small firm chooses to supply may have few rivals but may be subject to *hit and run* competition. In such markets a few rivals may only be required for intense competition.

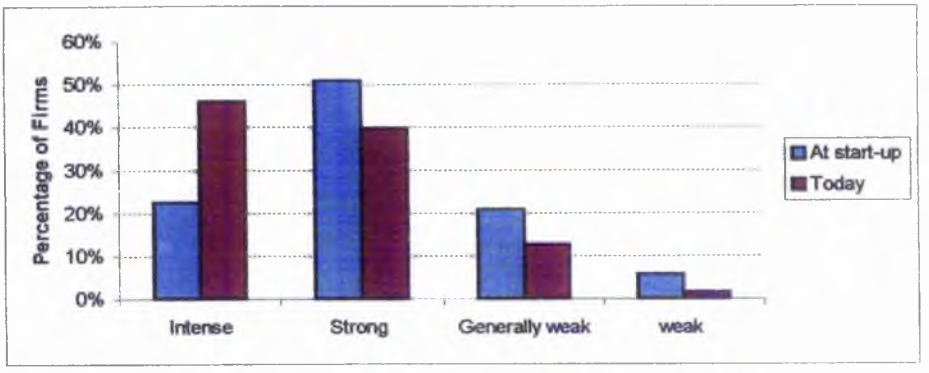
On average, the long-lived small firm faced competition from 26 (125.19) major rivals and 84 (400.56) minor rivals. In general, this simple index of the intensity of competition indicates greater competitive pressure in markets, with a greater number of major and minor rivals. Even with an average of just 26 major rivals, this pressure can be intense. A considerably large number of competitors are not required for intense competition. A few competitors would do for effective competition, particularly as stated above, if markets are subject to *hit and run* competition.

Rather than a count of the number of direct competitors or rivals Reid *et al.* (1993) showed that market concentration had a considerable bearing on competitive pressure. Reid *et al.* (1993) discussed the extent of rivalry in three classes of market models, namely monopolistic competition which they applied to low concentration markets, dominant firm with competitive fringe which they applied to medium concentration markets and conjectural oligopoly which they applied to high concentration markets. Concentration was measured by the proportion of output (e.g. sales, employment etc.) accounted by a certain number of the largest firms operating in the industry. The extent of rivalry within these market models was assessed for a number of case studies using Porter's (1980) Five Forces model. Rivalry was shown to be intense for firms operating in low concentrated markets as opposed to firms operating in high concentrated environments. Without conducting a similar detailed analysis I can only surmise in Reid *et al.* (1993) terms that out of the sample of 63 firms, a ninth (11.1%) expected to compete with rivals in a contestable niche (and operated in a 'dominant firm with competitive fringe' market model), approximately a

third (27%) expected to face less competition in niche markets (and operated in a 'conjectural oligopoly') and more than half (61.9%) firms expected to compete head-to-head with competitors (and faced 'monopolistic competition').

Typically the long-lived small firm felt that rivalry within their market was strong and that the competitive environment had become more hostile since start-up. Out of the sample of 63 mature small firms, nearly half (46%) described competition as intense in all aspects such as price, quality etc.; over a third (39.7%) thought competition was strong but weak in some aspects such as strong quality competition but weak price competition; an eighth (12.7%) felt that competition was generally weak but strong in some aspects; and two percent (1.6%) of firms felt that competition was generally weak in all aspects. Figure 5.6 illustrates the increased hostility of the competitive environment following start-up. There has been a marked decline in the percentage of firms in benign competitive environments. A test of the null hypothesis of equality between the mean rank for intensity of competition at start-up and mean rank in 2001 was rejected [Wilcoxon Signed Rank Test Z statistic=–3.888, p-value<0.0001; see Table 5.10 above]. A Sign's Test confirmed this result also (Z statistic=–3.712, $p<0.0001$). This is perhaps because the markets which they occupy, have matured. An increase in the intensity of competition is not necessarily a negative phenomenon. Porter (1985) argues that intense competition promotes efficiency, that is, competitors who, by engaging in sharp and challenging rivalry, actually promote the innovativeness of incumbent firms, and hence improve their prospects of staying in business. Nickell (1996) is not convinced that there is a direct link between intense competition and performance but is persuaded by its capacity to weed out inefficient firms.

Figure 5.6: Intensity of Competition



Note: Today represents the year 2001

5.3.2.2 Niche Players

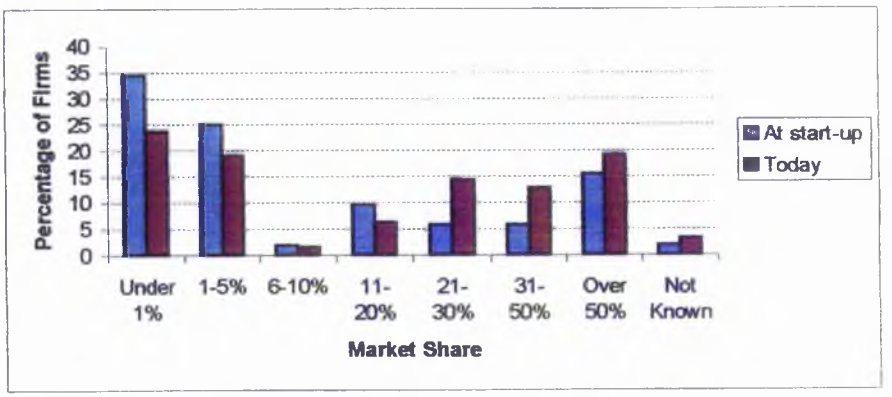
Hostile environments are dominated by many similar sellers (Kay, 1993) and typically the long-lived small firm has an infinitesimal share of these markets. Nearly a quarter of the firms (23.8%) had a market share of less than one percent. However the variation ratio[8] at 77.2% is high implying that over three quarters of the mature small firms had a larger share of smaller markets (i.e. niche markets; see Figure 5.7). Small firms have a larger share of these markets, as they are unattractive to, or sheltered from, larger rivals, given their size. A higher-level of market share in these markets is assumed to raise small firm's opportunity to exercise market power, and to improve its survival prospects (Caves and Porter, 1977).

Nearly two thirds (65.1%) of long-lived small firms had expanded their market share since start-up. The market share of the small firm in 2001 was dependent on its market share at start-up (Kendalls tau_b=0.724, p-value<0.0001) and on the age of the firm (Kendalls tau_b=0.265, p-value<0.01). Thus there is evidence of path dependence: initial market share is important. As the small firm matures, its share of its main market tends to increase also. This is partly because the firm's main market becomes more localised as it matures. The correlation between main market and age is negative confirming this tendency (Kendalls tau_b=-0.135, p-value<0.1 in left tail). Market share was significantly

[8] The variation ratio represents the percentage not in the modal category. It is a measure of spread for categorical variables.

negatively correlated with market extent (Kendalls tau_b=-0.222, p-value<0.5). This suggests that mature small firms have larger shares of localised markets. Figure 5.7 shows the percentage of firms at different levels of market share at start-up and then later, in 2001. There was a decrease in the percentage of firms with market shares of less than 20%, and a rise in the percentage of firms with market shares of 20% or more. This shift was significant [Wilcoxon Signed Rank Test Z statistic = -3.095, p-value <0.001]. Thus the long-lived small firm's share of niche markets increases as it ages.

Figure 5.7: Market Share

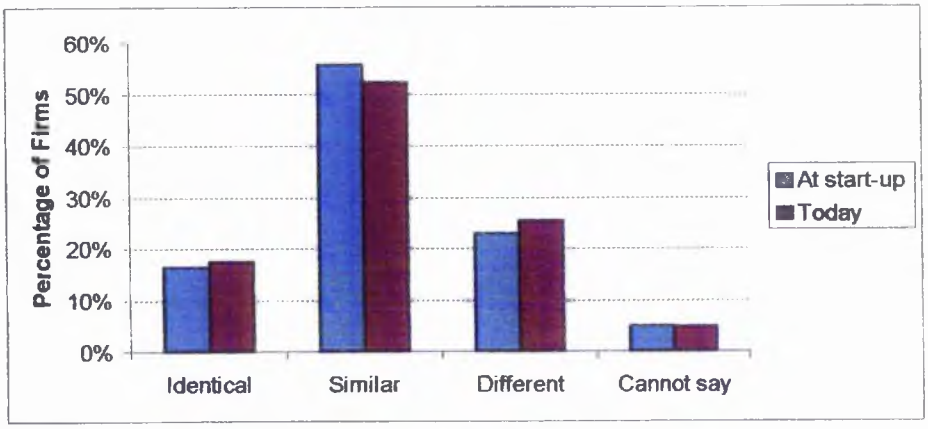


Note: Today represents the year 2001

To survive in hostile environments, the small firm often differentiates its product(s). Survival of small firms is linked to product differentiation (i.e. adoption of niche based strategies), see Reid, (1993). The owner-managers were asked to self-appraise the level of differentiation of their products and services relative to their direct competitor's product offering. In general, the small firm tried to differentiate its product offering: A quarter (25.4%) sold different products; over half the sample sold similar but not identical products (52.4%); less than a fifth (17.5%) sold identical products; and nearly five percent (4.8%) could not say either way. Typically, long-lived small firms engaged in product differentiation throughout their life. Only a quarter (25.4%) of mature small firms stated that their resort to differentiation had changed since start-up. If there were changes, they could be in both directions (see Figure 5.8). There was no significant difference in the ranks (see Table 5.10 above). It is likely that the product offering of some small firm's

became similar to competitors over time (i.e. their differentiated products became the standard product over time) whereas other small firms were forced to differentiate their products to survive.

Figure 5.8: Level of Differentiation



Note: Today represents the year 2001

5.3.2.3 Excess Capacity

Excess capacity is another characteristic of unstable competitive environments. Over half (55.6%) of the long-lived small firms indicated that they were capacity constrained. Typically, these firms operated at close to, but not quite full, capacity (viz. at 74% capacity). The existence of excess capacity is characteristic of mature markets. It can act as an entry deterrent (because it allows rapid reaction to invasion of market territory) but also can increase the intensity of competition among direct competitors, and thus, perhaps, the hostility of the market.

5.3.3 Conclusions

The typical long-lived small firm had expanded its market extent since start-up, although there is evidence of path dependence between the firm's market extent at inception and at the time of interview (i.e. lock-in effects). There was evidence of a positive relationship between size and the geographical extent of the firm's main market. This relation is explored further in a simultaneous equations analysis in Chapter 9. Most firms expected to compete head-to-head with rivals, and certainly believed that the competitive environment had become more hostile since start-up. The markets in which they operated had perhaps matured, thus increasing the intensity of competition. The

market share of the typical long-lived small firm had increased as the firm matured, and this was more likely in localised markets. There was evidence of path dependence here too. The typical long-lived small firm sold differentiated product offerings throughout its lifecycle. Therefore, over the long haul, the long-lived small firm tried to avoid direct competition in increasingly hostile markets, through tactics like increasing the differentiation of their products, and expanding their share of localised markets. To survive in hostile or turbulent markets greater flexibility is preferred to less flexibility (*c.f.* Hart, 1950). Relevant too, in this context is the argument of Mills and Schumann (1985), that allowing for larger diversity between rivals, greater flexibility tends to be more associated with smaller, rather than larger firms. The impact of flexibility on the performance of the small firm is examined in Chapter 8.

5.4 General Conclusions

This Chapter presents a detailed picture of the long-lived small firm in the sample and of the market environments in which it operates. As well as characterising the 'typical' long-lived small firm, it provides a point of reference for interpreting the results of inferential analysis on performance. It also complements the case analysis evidence presented in Volume II, Appendix 5. It highlights the influence of intergenerational effects on the survival of the long-lived small firm as a fruitful area for future research on these firms. The influence of intergenerational effects is followed up in a small way in the discussion on end-games in Chapter 7. There is also a discussion of these effects in the case analysis in Volume II. It is apparent that a more detailed analysis of intergenerational effects, developing work like that of Lotti and Santerelli (2002) is a promising area for future research.

This Chapter also contributes to the literature by testing Gibrat's Law over the lifecycle of the long-lived small firm. This used new data on the trajectory of real turnover, full-time equivalent employees and labour productivity. The analysis concentrated solely on surviving firms, as tests for sample selectivity bias suggested that this effect had no appreciable effect on the results. Gibrat's Law was rejected for the early years of trading, but after five years there was evidence in support of Gibrat's Law and Jovanovic's (1982)

proposition that growth was independent of size for mature firms. This evidence was conclusive for real turnover, and to a lesser extent for FTEs and labour productivity.

The analysis of broad changes in the competitiveness of the market of the long-lived small firm is another feature of the analysis. This was conducted by comparing the characteristics of the market at start-up, and at the time of interview, using small sample statistics in an innovative way. From this analysis, we find that entrepreneurs tend to differentiate their product offering, expand their market reach, where possible, and their market share of localised markets. There is evidence of lock-in effects in the choice of market at start-up. The geographic scope, and the share of this market at start-up, effects the extent to which the small firm has the ability to expand its market 'reach' and its market share.

Chapter 6 and 7 below will build on this analysis. Chapter 6 describes the performance of the long-lived small firm, using objective measures of performance and a novel subjective measure of performance, developed specifically for this study. Chapter 7 broadens the characterisation of the long-lived small firm, to include an analysis of factors which promote longevity (e.g. market positioning, innovation, technology, the scope of the firm's administrative organisation). The analysis also includes an examination of key organisational changes (e.g. changes in ownership, capacity) experienced by the firm, and the end-games that are considered by owner-managers.

CHAPTER 6 MEASUREMENT OF LONG RUN SMALL FIRM PERFORMANCE

6.1 Introduction

There are many definitions of organisational performance but little consensus regarding which definitions are superior, or on the criteria against which definitions of performance should be judged under different contexts, see Kanter and Brinkerhoff, (1981). Smith (1997a) and Reid and Smith (2000a) identify three approaches to measuring performance in small firms. In particular, they contrast an objective measure (e.g. quantitative measures like profitability and rate of return) with a subjective measure (e.g. a judgmental evaluation of performance, drawing on both quantitative and qualitative evidence). Mature small firms in this sample have clearly passed an objective performance criterion, such as the long-run economic test of survival ($\pi \geq 0$), see Reid (1991) and Barney (1991). However, long run survival as a criterion per se provides no insights into the drivers of above-normal performance. This Chapter develops a new multi-dimensional measure of performance, in the sense of an index which captures the fitness of the firm to survive over the long haul. This measure is based on owner-managers' self-appraisals of the importance of each of 28 factors which foster the long run survival of the firm (e.g. a subjective measure of performance), see subsection 4.3.4. The measure is used in inferential analysis in Chapters 8 and 9 because it is both more comprehensive and more compatible with our evidence base for reasons outlined in this Chapter.

Essentially, this Chapter examines the efficiency of performance measures, both objective and subjective measures. The discussion is structured as follows: First, the effectiveness of objective measures in assessing the long run performance of small firms is examined in Section 6.2. This is followed, in Section 6.3, by a discussion of the construction of the subjective performance score. The underlying determinants of this self-appraised measure of performance are also examined using factor analytic techniques (see Gerbing & Andersen, 1998; Hair *et. al.*, 1995). The reliability of this measure is assessed. Finally, the predictive power of the new multi-dimensional measure of performance is examined in Section 6.4. Section 6.5 concludes this Chapter.

6.2 Objective Measures of Performance

This Section evaluates the ability of objective measures of performance (e.g. traditional accounting measures) to capture the long run performance of small firms in

this sample. The financial data gathered included asset growth, profitability and indebtedness. The usefulness of these measures in assessing the long run performance of mature small firms is explored below.

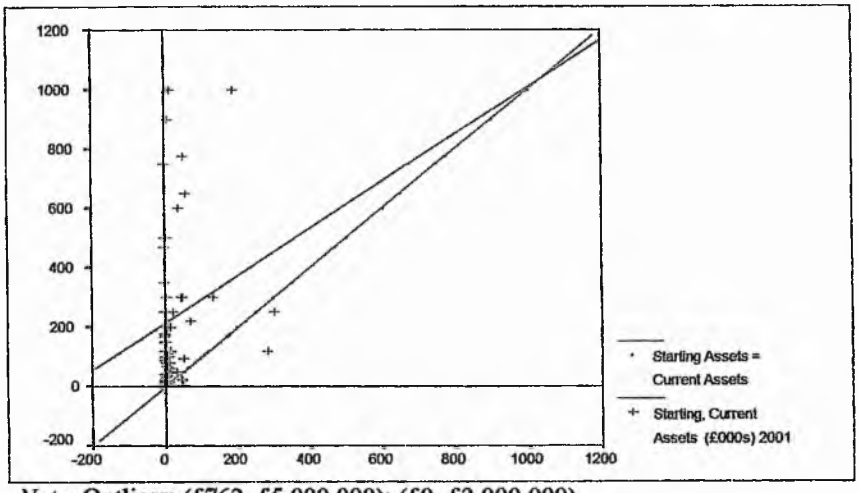
6.2.1 Asset Growth

Asset accumulation occurs from period t to $t+\tau$ where τ= 1,2,3,.... units of time (days, months, years etc.), if the assets of the small firm ($A_{t+\tau}$) in time period $t+\tau$ is greater than the assets of the firm (A_t) in time period t. A decline in growth occurs if $A_{t+\tau} < A_t$. Asset accumulation may have a significant wealth enhancing effect for the owner-manager (e.g. as a pension, or nest egg, on retiring) and by aggregations, for the economy as a whole. Arguably, it is an indicator of the long run performance of the firm. To consider the converse, Reid (1993) found that small firms which started with a low asset base, often failed to accumulate assets over the lifecycle and therefore tended to go out of business. Such small firms were relatively vulnerable, and had low exit costs. However, to assess the ability of real asset growth to explain the long run performance of the firm an examination of asset accumulation of the mature small firms in the sample is required.

The typical long-lived small firm in this sample was set up on a shoestring 25 years or more ago. Average assets at inception (reflated to 2001 prices) were £27,301stg. Since inception, average assets grew twelve fold and were £330,425stg in 2001. Therefore the financial wealth (approximated by the book value of real assets net of depreciation) grew considerably over the life of the small firm. Figure 6.1 illustrates this large degree of asset accumulation over the life of the firm. The horizontal axis represents assets at inception, and the vertical axis, assets at the time of subsequent interview, expressed in 2001 prices respectively. Points on the 45^0 line correspond to cases where assets have not grown between start-up and 2001. Here, a similar pattern emerges to that displayed in Figure 11.9 in Reid (1993). However, the scale of asset accumulation in this phase diagram is much greater. Some long-lived small firms achieved significant asset accumulation over their life. The two main outlier points, expressed in terms of (A_t, $A_{t+\tau}$) at constant 2001 prices, are given by (£762, £5,000,000) and (£0, £2,000,000). They illustrate the marked extent of the asset accumulation in some cases. These firms are fast-growth firms or "gazelles" as denoted by Birch (1996). They represent a very small proportion of the long-lived small firms in the

sample. Less than a tenth (8%) had an asset base of £800,000stg. or more in 2001 (see Table 6.1, which cross-tabulates assets at inception and assets at the time of interview expressed in 2001 prices).

Figure 6.1: Asset Growth From Financial Inception



Note: **Outliers: (£762, £5,000,000); (£0, £2,000,000)**

Whereas most long-lived small firms experienced some accumulation of assets over their life[1], few small firms achieved growth rates in assets to the degree mentioned above. Approximately, three quarters of the sample started with assets with a value of less than £15,000stg. (at 2001 prices). Over a fifth (22.4%) of the total number of firms interviewed had assets with a value under £50,000stg in 2001. More than half (51.7%) the firms had a book value of assets value of under £150,000stg in 2001.

[1] This is visible form Figure 6.1 because most of the points are above the 45^0 line where $A_{t+\tau} = A_t$.

Table 6.1: Real Asset Accumulation (2001 Prices)

Assets at Inception (2001 Prices)		Assets in 2001									
		Under 50K	**50K – 100K**	**100K-150K**	**150K-200K**	**200K-300K**	**300K-500K**	**500K-800K**	**800k-1200K**	**1200K+**	**Total**
	Under 15k	9 (15.5%)	9 (15.5%)	6 (10.3%)	7 (12.1%)	2 (3.4%)	4 (6.9%)	1 (1.7%)	2 (3.4%)	2 (3.4%)	42 (72.4%)
	15K-30K	1 (1.7%)				1 (1.7%)					2 (3.4%)
	30K-50K	3 (5.2%)				2 (3.4%)		1 (1.7%)			6 (10.3%)
	50K-100K		1 (1.7%)			1 (1.7%)		2 (3.4%)			4 (6.9%)
	100K-150K					1 (1.7%)					1 (1.7%)
	150K-200K								1 (1.7%)		1 (1.7%)
	200K+			1 (1.7%)		1 (1.7%)					2 (3.4%)
	Total	13 (22.4%)	10 (17.2%)	7 (12.1%)	7 (12.1%)	8 (13.8%)	4 (6.9%)	4 (6.9%)	3 (5.2%)	2 (3.4%)	58 (100%)

Asset accumulation may be a positive predictor of staying in business but its predictive power is weak (see Reid, 1993). Cressy (1996) found its predictive power was further weakened when account was taken of human capital. It is evident from Table 6.1 above that almost a quarter of the long-lived small firms are still trading with a very low asset base. The failure of the book value of assets to capture intangible assets, which include items, such as goodwill (i.e. the reputation value of the firm, its customer lists etc.) and the human capital of the owner-manager, may provide an explanation for this. Intangible assets can represent a significant amount of the value of small firms, particularly those operating in the service sector. The true market value of the asset base of the business could in fact be much higher although it is recognised that some of the intangible asset base of the business is tied to the entrepreneur.

Given that nearly two thirds of the mature small firms in the sample are service firms, underestimation of the market value of the asset base is perhaps sizeable, and thus there are difficulties with relying on asset growth as a measure of long run performance. Moreover data for assets at inception is only available for fifty-eight cases in the sample. Owner-managers of the five firms formed by buying-out the founders of the firm actually did not know the value of the firm's assets at inception.

6.2.2 Accounting Profit

Accounting profit is the nearest approximation to economic profit available in this study but it is far from an adequate approximation (Fisher and McGowan, 1983). On average, net profits (with standard deviation in parentheses) were £39,971stg (93,989) less depreciation and directors remuneration. There are difficulties in relying on this measure to approximate the long run performance of the small firm, which are particular to the small firm case.

The issues relevant to performance measurement in the context of the small firm are well-documented (see Dess and Robinson, 1984; Sapienza *et al.* 1988). Self-reported net profit figures by owner-managers are subject to much variation as small firms are not subject to the same reporting standards of large incorporated firms (Ballantine *et al.*, 1993). Accounting records are less reliable as ownership is not separated from control (See Keasy and Watson, 1991). Owner-managers of small firms find it difficult to distinguish profit from income, see Reid (1993). Owner-managers do not like to report high profits also. According to Reid (1993) "*Owner-managers do not like to admit a high profit. It might imply certain levels of tax liability, it might suggest that their market is not being adequately contested by actual and potential rivals and it might also suggest that surpluses could be channelled to raising the wage bill*" (p.113).

The rate of profitability measured by net profits per pound of assets is perhaps another indicator of performance. On average, net profits per pound of assets in 2001 was 33% (61%), which relative to the banks rate of interest is quite high (standard deviation in parentheses). It was also high relative to the sales margin in 2001 (percentage profit per pound sterling of sales), which was on average 8.52% (13%). This is perhaps due to the under valuation of assets (excludes intangible assets) or failure to distinguish profit from income, (i.e. the misgivings of its underlying components). A measure between 8.52% and 33% might be a more accurate measure of return.

Net profits and the rate of profitability are instantaneous (i.e. one point in time) measures of performance rather than measures of long run performance. A rate of change in rate of profitability over time is perhaps a more appropriate measure of long run profitability. However, this measure is not available for an adequate proportion of the sample. Figures on assets and net profits are only available for 20 firms for the year

1985. However, to test the inferences examined in Part V, a performance measure which is defined for the entire sample is preferable. Further, given sensitivities about disclosing net profit figures, two small firms in the sample refused to provide this information at the time of interview.

6.2.3 Financial Structure

In examining the survival of small business start-ups, Reid (1991) found that gearing had a significant negative effect on small firm survival. However if equity finance is a cheaper source of finance capital, Reid (2003) found that the optimal strategy for highly geared small firms is to retire debt early in its lifecycle. Later in the firm's lifecycle, many forms of capital could be appropriate to the long-run survival of a specific firm. In general, for a higher level of external liabilities, a lower level of performance is expected.

Over two thirds (68.3%) of the mature small firms interviewed were financed through some form of debt. On average, these firms had two forms of debt. Nearly a half (44.4%) had a bank overdraft; two-fifths (39.7%) had a bank loan; nearly a quarter (22.2%) used hire purchase; and an eighth (12.7%) used other forms of debt finance, including, notably, leasing agreements. These were the main source of finance capital, apart from private equity. Outside equity was uncommon. Only three firms out of the sixty-three interviewed had any outside equity finance. These three firms were significantly bigger in size as measured by FTEs (T statistic= 2.319, p-value=0.023 <0.05; see Table 6.2) and assets (T Statistic= 1.688, p-value=0.096 <0.1; see Table 6.2) in 2001 but not in terms of turnover. Further, there was no significant difference in the level of liabilities of these firms (see Table 6.2). In general, those firms which possessed outside equity finance had changed ownership over the life of the firm (i.e. the founders of the firm continued to hold an equity stake in the firm following the trade-sale).

These findings confirm the tendency for owners of mature small firm to have a clear preference for sources of financing that minimise intrusion into their business.[2] According to Lopez-Gracia and Aybar-Arias (2000) financing is based on, firstly personal savings and resources generated internally; secondly, short or long term debt; and thirdly, least preferred of all, new share issues that dilute control. This corresponds

[2] Control aversion in small medium sized enterprises has been well documented by Cressy (1995), Chittenden et al. (1996), Reid (1996) and Berggren, Olofsson and Sliver (2000).

to the pecking order theory of optimal capital financial structure as proposed by Myers (1984).

Table 6.2: T Test for two Independent Samples

Variable	Equity Finance	N	Mean	T statistic	d.f.	Sig. (2-tailed)
FTE 2001	Yes	3	38.667	2.319	61	0.024
	No	60	12.292			
Gross Sales 2001[a]	Yes	3	3393333	1.568	61	0.256
	No	60	706150			
Liabilities	Yes	3	2.333	0.622	61	0.536
	No	60	1.8			
Assets 2001	Yes	3	970833	1.689	61	0.096
	No	60	298405			

Note: [a]T test is conducted under the assumption of unequal variances.

Statistical analysis indicates that the extent of liabilities is not age related. A significant relationship was not found to exist between the extent of the firm's liabilities and age (Pearson's R = -0.165 at a p-value of 0.196). The negative correlation supports Reid's (2003) findings that the small firm typically seeks to retire debt early in its lifecycle. A significant positive relationship was found to exist between the extent of the firm's liabilities and the number of full-time equivalent employees (Pearson's R =0.323 at a p-value of 0.01). This is in the opposite direction to that found by Lopez-Gracia and Aybar-Arias, (2000). The existence of a generally smaller firm size in this sample[3] and the limitation of Lopez-Gracia and Aybar-Arias's(2000) data to the two year period 1994-1995[4] may explain the difference in the findings. Credit is perhaps rationed to smaller firms (Calomiris and Hubbard, 1990) due to asymmetric information between lenders and smaller firms (Berger and Udell, 1998). As a result, lenders wish to limit their exposure to perceived riskier projects (see Stiglitz and Weiss, 1981; Petersen and Rajan, 1994).

6.2.4 Conclusion

The reliability of traditional accounting measures (e.g. asset growth, net profits etc.) as measures of long run performance in the small firms context was questioned in

[3] Half of our sample are not private companies and therefore are not required to submit their accounts to companies registry office like the sample of Spanish firms selected for Lopez-Gracia and Aybar-Arias (2000) study.

[4] Lopez-Gracia and Aybar-Arias's (2000) sample probably contains young and old small firms.

this section. There are misgivings about adopting asset growth as a measure of long-run performance, because of lack of, or poor accounting for, the intangible asset base of small businesses. Failure to account for the value of intangible assets is particularly troublesome, given that two thirds of the sample of long-lived small firms is small service based firms. Difficulties in ascertaining net profit from income, and practices of small firms involving under-reporting of profits raise questions about the accuracy of measures based on firm profitability. It is also difficult to gather data on these financial measures of performance of long-lived small firms retrospectively. The measures available in this study are only instantaneous rather than continuous indicators of long run performance. As it happens, different objective performance measures were gathered for each of the three parent samples. Further, data on the three parent samples were collected at different points in time. Thus there is an intrinsic lack of comparability of these measures over the full lifecycle of the firms.

Simple measures, such as employment growth or sales growth, over the life of the firm, which are arguably subject to less distortion, could be adopted to proxy long run performance. However complete data are only available for 44 firms, in the case of sales growth, and 56 firms, in the case of employment growth. There are other problems with these measures also. It was found in Chapter 5 that real turnover grows at the market rate, after 5 years of trading (see subsection 5.2.5). Therefore sales growth arguably fails to account for other sources of long run improvements in performance, such as increases in efficiency or reductions in costs etc. Moreover, Reid (1993) found a negative relation between profitability and growth, thus casting further doubts about the usefulness of the growth measures in approximating long run performance of the small firm. Negative employee growth is also difficult to interpret in this context. Does it reflect efficiency improvements or poor performance? As wages are a principal cost driver for many small firms, tight control of the wage bill (e.g. by laying off, or casualising, staff) can enhance performance, Reid (1999). This affect is often associated with technical change (e.g. substituting office based computing for manual clerical work). Further, a measure of performance other than sales growth and employment growth is preferable for examining trade-offs between size and performance in Chapter 9.

These concerns prompted the development of a subjective measure of performance. Resorting to a new performance measurement approach, which is common to the three sub-samples, allowed the empirical work to be undertaken on a common basis.

6.3. Subjective Measure of Long Run Performance

To assess the long run performance of small firms in the sample, owner-managers were asked to self-appraise the firm's performance, in terms of factors which had helped to keep them in business. The fitness of the small firm to survive over the long haul was appraised over twenty-eight items which covered aspects of the firm's business strategy (9 items), financial management (4 items), internal organisation (4 items) and environment (11 items). The items, included in this multidimensional index of long run performance, were inspired by both the theoretical and empirical literature on factors which influence the survival and growth of small firms (see Subsection 4.3.4 for a discussion of the design of this measure).

Respondents self-appraised each item (e.g. technology, rival's innovation, regulation etc.) on a 100-point scale of performance. A score '0' indicated that the item impacted negatively on the performance of the firm. A score of '100' indicated that the item impacted positively on the performance of the firm. A score of '50' indicated that the item had a neutral effect on the firm's long run performance (see Table 4.10). The performance index for each firm was computed by summing the scores for each item. Scores were normalised to take account of those items that were not applicable (i.e. the total score was divided by the number of items rated)[5]. Out of a maximum performance score of 100, the average long-lived small firm scored 67; the measure ranged from 49 to 90. Low performers had a performance rating between 49 and 62 (i.e. the lower quartile) and high performers had a performance rating of 73 to 90 (i.e. the upper quartile).

The parsimony, reliability and validity of this new index are investigated below. The reliability of the measure is tested in Subsection 6.3.2. The constructs underlying

[5]In statistical tests it was found that the number of items check by the respondent as being relevant to them was not related to age (Pearson's R=-0.139, p-value=0.277) but was weakly positively related to size as measured by FTEs (Pearson's R=0.329, p-value=0.009) and turnover (Pearson's R=0.218, p-value=0.086). This implies that larger firms need to juggle more factors to survive.

this index are explored using factor analytic techniques in Subsections 6.3.3-6.3.5. The predictive validity of the measured is assessed in Section 6.4.

6.3.1 Factor Analytic Techniques

An understanding of the attributes, which underlie performance, increases our knowledge of influences on long run survival. Factor analysis is a multivariate statistical tool that can be used to examine the underlying patterns of relationships among a larger number of variables and to determine whether or not the information can be summarised into a smaller set of constructs or attributes (Child, 1970; Loehlin, 1992). It can be used from either an exploratory or a confirmatory perspective.

In exploratory factor analysis, no a priori constraints are set on the number of factors extracted. The researcher seeks, under rather general assumptions, a latent variable structure that accounts for the inter-item correlations of an observed set of variables. In confirmatory factor analysis, on the other hand, the researcher has some preconceived thoughts based on prior research about the actual structure of the data (Hair *et al.* 1995). The researcher takes a specific hypothesised structure and sees how well it accounts for the observed relationships in the data. Joreskog (1974) notes that many investigations are to some extent both exploratory and confirmatory, since they involve some variables of known, and other variables of unknown, composition.

To cope with this kind of investigation, methodologists recommend the use of a statistical procedure, which comprises: (1) exploratory factor analysis; (2) reliability analysis; and (3) confirmatory factor analysis for validating measures (Gerbing & Andersen, 1998; Hair *et al.* 1995). Accordingly, this procedure is adopted here to identify and validate the underlying constructs of the long run performance index.

6.3.2 Reliability Test

The purpose of reliability analysis is to find those items that form an internally consistent scale, and to eliminate those items that do not. This Subsection presents the results of the reliability assessment through examining 1) item means and variances [see Table 6.3] 2) inter-item correlations [see Table 6.4] and 3) Cronbach's (1951) alpha coefficient. The results are interpreted in turn below. Generally the scale items were applicable to almost all the long-lived small firms in the sample[6] however where an

[6] Items, which were common to the long run survival of all firms included competition, cashflow, quality, operational efficiency and skills. Items checked less frequently included new entrants (47), rival's innovation (48), regulation (53), credit policy (54), market research (47) differentiation (53), advertising

owner-manager stated that an item was not applicable a value of 50 (*neutral rating*) was entered. This ensured that there was no the missing values and facilitated the calculation of inter-item correlations and Cronbach's alpha, as well as enabling a factor analysis to be conducted.

Item Means and Variances

If item means are close to the centre of the range of values and if item variances are high, this indicates that items are discriminating properly amongst the views of owner-managers. Items with a mean rating close to centre of the distribution (i.e. mean values close to 50; range is 1-100) included competition 54 (23.3), substitutes 50 (22.9), new entrants 43 (21.5), rival's innovation 45 (23.2), debt 48 (26.3), regulation 47 (22.7), credit policy 59 (26.5) and advertising 53 (2) (with the corresponding standard deviations in parentheses). The standard deviations are high in all these cases except for advertising. This indicates heterogeneity in the assessment of owner-managers (i.e. received good and bad ratings) about the contribution of these items (other than advertising) to the long run survival of the firm. This heterogeneity generally relates to environmental items and aspects of financial management within the small firm. This is understandable for environmental items as these are largely outside the control of managers.

Those items with mean performance ratings of 75 or more include suppliers, 75 (14.4); customer loyalty, 82 (15.8); quality, 88 (12); differentiation, 75 (18.5); product mix, 81 (12.8); diversification, 76 (16.5); operational efficiency, 78 (15.5); and skills 80 (16.7) (with the corresponding standard deviations in parentheses). The mean ratings are high (well above the neutral 50) and the standard deviations are low, indicating that, in general, owner-managers are in agreement on the contribution of these items to long-run survival. High ratings on these items are consistent with evidence on factors promoting the survival of long-lived small firms (Brush and Chaganti, 1998; Leigh *et al.*, 1991; Smallbone *et al.*, 1992; Reid *et al.*, 1993; Seigal *et al.*, 1993; Reid, 1993). The full range of the distribution (0 to 100) was adopted in rating items in most instances.

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(51), diversification (53) and filling product gaps (47) (with counts in parentheses). The least checked item was substitute goods which were only applicable for long run survival in twenty-five cases (see Table 6.3).

Table 6.3: Summary Statistics of Scale Items

		Suppliers	Growth	Competition	Buyer's willingness to pay	Customer loyalty	Access to buyers	Substitutes	New entrants	Technology	Rival's Innovation	Regulation	Cashflow	Debt	Credit Policy	Capital requirements	Market positioning	Location	Cost Control	Quality	Market research	Differentiation	Advertising	Product Mix	Diversification	Operational efficiency	Skills	Monitoring	Filling product gaps
Applicable		61	62	63	62	62	61	25	47	57	48	53	63	58	54	58	60	61	61	63	47	53	51	61	53	63	63	58	47
Not Applicable		2	1	0	1	1	2	38	16	6	15	10	0	5	9	5	3	2	2	0	16	10	12	2	10	0	0	5	16
Mean		75	71	54	63	82	67	50	43	72	45	47	66	48	59	64	74	70	74	88	63	75	53	81	76	78	80	68	69
Std. Deviation		14.4	18.5	23.3	23.7	15.8	18.8	22.9	21.5	17.5	23.2	22.7	25.7	26.3	26.5	24.3	16.6	23.1	18.5	12	21	16.6	2	12.8	18	15.5	16.7	19.7	21.7
Minimum		45	10	0	0	0	20	10	0	25	0	0	0	0	0	0	25	0	25	50	13	30	8	40	13	25	25	0	13
Maximum		100	100	100	100	100	100	100	88	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Percentiles	*25*	64	50	38	50	75	50	33	25	55	36	28	50	25	50	50	63	50	66	75	50	63	50	75	65	70	75	54	60
	50	75	75	50	68	85	70	50	50	75	50	50	75	50	60	63	75	75	75	88	63	75	50	85	75	79	85	70	75
	75	88	85	75	80	91	84	63	50	88	50	56	87	63	79	86	85	88	88	90	75	88	68	88	88	88	90	88	85
Skewness		-.432	-.840	.036	-.447	-2.4	-.496	.198	-.020	-.393	-.065	.365	-.688	.181	-.232	-.565	-.554	-.926	-.986	-.827	-.593	-.538	-.255	-1.0	-.987	-.901	-1.4	-.962	-.895
Std. Error of Skewness		.306	.304	.302	.304	.304	.306	.464	.347	.316	.343	.327	.302	.314	.325	.314	.309	.306	.306	.302	.347	.327	.333	.306	.327	.302	.302	.314	.347
Kurtosis		-.643	.675	-.429	-.263	11.2	.039	-.111	-.127	-.440	.321	.012	-.402	-.645	-.452	-.144	.211	.874	.839	1.21	.331	-.025	-.168	2.02	1.92	1.36	2.38	1.58	.647
Std. Error of Kurtosis		.604	.599	.595	.599	.599	.604	.902	.681	.623	.674	.644	.595	.618	.639	.618	.608	.604	.604	.595	.681	.644	.656	.604	.644	.595	.595	.618	.681

Inter-item correlations

High inter-item correlations suggest that scale items are all measuring the same concept. The failure of scale items to inter-correlate with one another is an indication that items do not represent a common underlying construct. However, the failure of some items to correlate significantly with others can be due to the fact that performance is multi-dimensional. Some of the dimensions are related, others may not be.

No inter-item correlations are above 0.6 (see Table 6.4). The highest significant correlation is between cost control and operational efficiency at 0.584 (significant at p-value 0.0001). Other relatively high inter-item correlations include: credit policy and buyers willingness to pay (0.521); monitoring and skills (0.497); capital requirements and market positioning (0.444); credit policy and customer loyalty (0.434); quality and product mix (0.414); and skills and operational efficiency (0.413). These correlations are all significant at p-value<0.0001. Most of the remaining significant correlations are between 0.2 and 0.4.

Cronbach's Alpha Coefficient

The closer the alpha coefficient is to a value of 1 the greater is the reliability of the items comprising the scale. Nunnally (1978) provides a widely accepted rule of thumb that alpha should be at least 0.7 for a scale to demonstrate internal consistency. The value of the alpha coefficient, for all 28 items, is 0.78, which is above 0.7.

Table 6.4: Inter-item Correlations

	Suppliers	Growth	Competition	Buyer's WTP	Customer Loyalty	Access to Buyers	Substitutes	New Entrants	Technology	Rival's Innovation	Regulation	Cashflow	Debt	Credit Policy	Capital Requirements	Market Positioning	Market Positioning	Cost Control	Quality	Market Research	Differentiation	Advertising	Product Mix	Diversification	Operational Efficiency	Skills	Monitoring	Filling Product Gaps
Suppliers	1																											
Growth	-.002	1																										
Competition	.120	.298	1																									
Buyer's WTP	.142	.057	.172	1																								
Customer Loyalty	.253	-.046	.053	.396	1																							
Access to Buyers	.085	.134	.168	.039	.296	1																						
Substitutes	-.043	.070	.185	.121	.103	-.025	1																					
New Entrants	-.097	.074	.164	.230	.058	.060	.095	1																				
Technology	.002	.221	.153	-.124	-.003	.126	.186	.054	1																			
Rival's Innovation	-.230	.149	-.064	.307	-.036	-.079	.164	.353	.032	1																		
Regulation	-.103	-.114	.195	.051	.013	.361	.123	-.153	.293	.021	1																	
Cashflow	.250	.274	.273	.191	.090	.206	-.310	-.061	.097	-.050	.218	1																
Debt	.088	.085	-.073	-.045	-.014	.254	.135	.111	.060	.209	.123	.122	1															
Credit Policy	.247	.099	.246	.521	.434	.130	.152	.056	.068	.150	.114	.253	.187	1														
Capital Requirements	.065	.285	.226	.260	.080	.057	.281	.040	.241	.053	.139	.130	.103	.079	1													
Market Positioning	-.047	.269	.243	.285	.037	.258	.069	.057	.107	.068	.331	.312	.099	.164	.444	1												
Location	.094	-.049	.108	.207	.281	.027	.028	.126	.018	.179	.257	.337	.033	.152	.138	.387	1											
Cost Control	.148	.216	.084	.260	.321	.313	.013	-.195	.041	-.022	.218	.281	.011	.222	.274	.394	.185	1										
Quality	-.037	.172	.024	.220	.207	.259	.033	-.085	.388	-.003	.363	.200	-.029	.257	.276	.308	.066	.155	1									
Market Research	-.053	.122	.098	.075	-.113	.017	-.075	-.096	.125	.085	.020	.053	.259	.171	.133	.353	.040	.084	.066	1								
Differentiation	.095	.193	.300	.176	-.030	.182	.012	-.068	-.011	-.079	.294	.390	-.029	.122	.287	.283	.260	.171	.298	.182	1							
Advertising	.111	-.049	.152	-.049	-.149	.242	-.086	.024	.061	.080	.050	.318	.265	.017	-.118	-.041	.119	-.145	.050	.127	.292	1						
Product Mix	.169	.003	.064	.027	.245	.191	-.008	-.210	.143	-.084	-.039	.118	.088	.270	.106	.081	.102	.114	.414	.097	.356	.225	1					
Diversification	.220	-.055	-.103	.026	.060	-.024	.008	.020	.041	.059	-.103	.071	.156	.059	-.077	.098	.232	.009	-.017	.209	.163	.219	.182	1				
Operational Efficiency	.153	.083	.028	.099	.220	.240	.094	-.078	.104	-.005	.168	.052	.120	.217	.333	.293	.048	.584	.245	.186	.100	-.187	.212	.123	1			
Skills	.052	-.149	-.051	.342	.240	-.028	.199	.217	-.067	.316	.090	-.169	.054	.289	.203	.206	.221	.226	.090	.148	.009	-.229	.015	.115	.413	1		
Monitoring	-.017	.076	-.301	.177	.102	.054	-.001	.000	-.102	.253	-.135	-.176	.300	.357	.040	-.024	.007	.163	-.045	.364	-.051	.005	.025	.109	.151	.497	1	
Filling Product Gaps	.174	.110	.138	.044	-.094	.042	.213	.151	.053	.371	-.173	.002	.163	.195	.197	.076	-.082	-.044	-.123	.284	.219	.099	.216	.293	.136	.165	.208	1

Significance (1 tailed)

	Suppliers	Growth	Competition	Buyer's WTP	Customer Loyalty	Access to Buyers	Substitutes	New Entrants	Technology	Rival's Innovation	Regulation	Cashflow	Debt	Credit Policy	Capital Requirements	Market Positioning	Market Positioning	Cost Control	Quality	Market Research	Differentiation	Advertising	Product Mix	Diversification	Operational Efficiency	Skills	Monitoring	Filling Product Gaps
Suppliers																												
Growth	.495																											
Competition	.175	.009																										
Buyer's WTP	.134	.329	.089																									
Customer Loyalty	.023	.359	.339	.001																								
Access to Buyers	.255	.148	.094	.381	.009																							
Substitutes	.370	.294	.073	.173	.212	.422																						
New Entrants	.224	.283	.099	.035	.327	.321	.230																					
Technology	.494	.041	.115	.167	.490	.162	.072	.338																				
Rival's Innovation	.035	.123	.308	.007	.389	.268	.099	.002	.402																			
Regulation	.211	.188	.063	.345	.459	.002	.168	.115	.010	.434																		
Cashflow	.024	.015	.015	.066	.242	.052	.007	.318	.226	.349	.043																	
Debt	.247	.253	.285	.364	.456	.022	.145	.194	.321	.050	.169	.170																
Credit Policy	.026	.220	.026	.000	.000	.155	.116	.331	.299	.121	.186	.023	.071															
Capital Requirements	.307	.012	.037	.020	.267	.329	.013	.378	.029	.340	.139	.155	.211	.270														
Market Positioning	.357	.016	.028	.012	.386	.021	.296	.329	.202	.297	.004	.006	.220	.100	.000													
Location	.232	.352	.200	.052	.013	.418	.415	.163	.444	.081	.021	.003	.397	.117	.141	.001												
Cost Control	.123	.045	.256	.020	.005	.006	.461	.063	.375	.433	.043	.013	.464	.040	.015	.001	.073											
Quality	.386	.089	.425	.041	.052	.020	.398	.254	.001	.491	.002	.058	.411	.021	.014	.007	.304	.112										
Market Research	.341	.171	.222	.279	.189	.446	.279	.227	.165	.253	.439	.340	.020	.091	.149	.002	.379	.257	.303									
Differentiation	.230	.065	.008	.084	.407	.077	.464	.299	.467	.269	.010	.001	.412	.171	.011	.012	.020	.091	.009	.077								
Advertising	.193	.353	.117	.352	.122	.028	.252	.425	.318	.267	.350	.006	.018	.447	.179	.376	.176	.128	.348	.161	.010							
Product Mix	.093	.492	.310	.418	.027	.067	.475	.049	.132	.256	.380	.179	.247	.016	.204	.263	.214	.187	.000	.224	.002	.038						
Diversification	.042	.334	.211	.421	.320	.427	.476	.437	.375	.324	.210	.291	.112	.324	.275	.222	.034	.473	.448	.050	.101	.042	.077					
Operational Efficiency	.116	.258	.414	.219	.041	.029	.231	.273	.208	.486	.094	.342	.175	.044	.004	.010	.354	.000	.026	.072	.218	.071	.048	.168				
Skills	.343	.121	.347	.003	.029	.415	.059	.044	.300	.006	.242	.093	.337	.011	.055	.053	.041	.038	.241	.124	.471	.035	.455	.185	.000			
Monitoring	.448	.277	.008	.083	.212	.337	.497	.500	.212	.023	.145	.084	.008	.002	.378	.425	.479	.101	.362	.002	.344	.486	.422	.198	.118	.000		
Filling Product Gaps	.087	.196	.141	.367	.232	.371	.047	.119	.341	.001	.088	.494	.102	.063	.061	.278	.263	.367	.167	.012	.042	.220	.044	.010	.144	.098	.051	

6.3.3 Exploratory Factor Analysis

To examine the underlying constructs of long run performance a subset of twelve items was chosen from the 28 scale items to be factor analysed. The subset was chosen in view of general rules regarding sample size ($N \geq 50$; N=63), and the ratio between sample size and number of items to be factor analysed (≥5 cases; 63/12≥5). Those items which were rated most frequently by small firms were included (i.e. items which were applicable to the long run performance of all or most small firms in the sample). By setting the cut off eigen-value at 1, five factors were extracted (using principal axis factoring). These factors explained 69% of the total variance, which is above the suggested threshold of 60% for social science studies (Hair *et al.* 1995). Table 6.5 presents the results after rotation [an orthogonal (varimax) and an oblmin rotation] to maximise the number of non-zero factor loadings and to facilitate interpretation. The factor names are based on their constituent elements. Each construct underlying long run small firm performance is interpreted below following the corroboration of this hypothesised structure using confirmatory factor analysis.

Coefficient alpha varied from 0.4 to 0.67 for each construct or factor extracted. These are close to, but below, Nunnally's (1978) recommended level 0.7. However, as found above Cronbach's alpha is 0.78 when all items are examined (and 0.7 for all 12 items). Certainly, increasing the sample size and thus reducing sample variability, could have improved the analysis. Reducing selection bias (the representativeness of the universe of items) through increasing the ratio of the number of items to the number of constructs (i.e. the number of items per factor the more informative the factor analysis) could also enhance the analysis.

Table 6.5: Exploratory Factor Analysis

	Extraction Method:	Principal Axis Factoring		Eigenvalues	Alpha Reliability
	Rotation:	**Varimax**	**Oblimin**		
Factor I	**Internal Organisation**				
	Operational Efficiency	0.806	.831		
	Cost Control	0.640	.651	2.911	0.67
	Skills	0.532	.504		
Factor II	**Industry Structure & Rivalry**				
	Cash flow	0.620	.596		
	Growth	0.580	.584	1.698	0.61
	Market Positioning	0.469	.403		
	Competition	0.422	.418		
Factor III	**Business Strategy**				
	Quality	0.943	-.977	1.309	0.59
	Product Mix	0.456	-.468		
Factor IV	**Resources**				
	Location	0.863	.895	1.242	
Factor V	**Nature of Buyers & Suppliers**				
	Suppliers	0.556	.547	1.108	0.40
	Customer loyalty	0.432	.366		
		6 iterations	11 iterations		

Note: Standardised alpha for the 12 items 0.70
The five factors extracted account for 69% of the total variance.

6.3.4 Confirmatory Factor Analysis

While exploratory factor analysis and reliability test are able to derive some plausible constructs, confirmatory factor analysis is particularly useful in validating the measurement of these constructs (Gerbing & Andersen, 1998 and Hair *et al.*, 1995). To assess the overall fit (i.e. convergent and discriminant validity of the measurement) of the five constructs extracted above, a similar analysis was performed, except that in this case the factors were extracted using the method of maximum likelihood. A chi-square test is used to assess whether the correlations implied by the factors extracted so far

constitute an adequate account of the original correlations[7]. As shown in Table 6.6, the Chi-square statistic resulting from the confirmatory factor analysis was 9.972 with 16 d.f. and a p-value of 0.868 which indicates that the present data fitted reasonably well the hypothesised measurement model. As regards convergent validity, Table 6.6 indicates that all the items had significant loadings on their corresponding constructs (at p-value<0.01)[8]. The correlations between constructs (or factors) were low; a value of 0.282 between Factor I and Factor III represented the highest correlation. This is weak evidence of discriminant validity between the constructs. The path loadings under the orthogonal and oblmin rotations are similar as a result.

[7] Chi-square is a measure of overall fit of the model to the data. It measures the distance (difference, discrepancy, deviance) between the sample covariance (correlation) matrix and the fitted covariance (correlation) matrix. Chi-square is a badness-of-fit measure in the sense that a small chi-square corresponds to good fit and a large chi-square to bad fit. Zero chi-square corresponds to perfect fit. Chi-square is calculated as N - 1 times the minimum value of the fit function, where N is the sample size.

[8] Critical values for salient factor loadings are +/-0.24 and +/-0.318 at the 5 percent and the 1 percent levels respectively in accordance with critical values for Pearson's moment correlation coefficients. Due to the uncertainty about the assessment of error in factorial work for small samples, it is safer to adopt the 1 percent level as the criterion for significance. For large samples (N>100) a rule of thumb widely used by factor analysts is that loadings having values +/- 0.3 or greater are taken as significant. Thus the value of +/- 0.318, the critical value at the 1 percent level for N=63, is more demanding (Child, 1970).

Table 6.6: Confirmatory Factor Analysis

	Extraction Method:	Maximum Likelihood	
	Rotation Method:	**Varimax**	**Oblimin**
		Path[a] Loading	***Path[a] Loading***
Factor I	**Internal Organisation**		
	Cost Control	0.649	0.667
	Operational Efficiency	0.793	0.817
	Skills	0.541	0.507
Factor II	**Industry Structure & Rivalry**		
	Cash flow	0.637	0.612
	Growth	0.549	0.551
	Market Positioning	0.478	0.412
	Competition	0.405	0.402
Factor III	**Business Strategy**		
	Quality	0.974	1.010
	Product Mix	0.440	0.447
Factor IV	**Resources**		
	Location	0.872	0.903
Factor V	**Nature of Buyers and Suppliers**		
	Suppliers	0.533	0.524
	Customer loyalty	0.429	0.364

Note: [a]All path loadings are significant (p-value<0.01)
Chi-square statistic =9.972 16d.f. at a p-value of 0.868.

6.3.5 Composition of the Five Constructs

Items were selected for inclusion in the scale under the following headings: environment, finance, business strategy and internal organisation, based on theoretical relationships to hypothesised dimensions of performance described by Sandberg and Hofer, (1987); Chrisman *et al.,* (1998). Chrisman *et al.*, (1998) extended the earlier Sandberg and Hofer (1987) model. The first described new venture performance as being a function of entrepreneurial attributes, strategy and industrial structure and it was extended to include resources and organisational structure. Items were not included on the values, beliefs, education and experience of the entrepreneur, as Sandberg and Hofer (1987) could not find evidence of the link between the entrepreneur and new venture performance. It was also decided that it was difficult to get the owner-manager to rate the effect of these items on the long run survival of the firm. An item was included for

skills, which could capture part of the influence of the entrepreneur on new venture performance. The constituent variables of factors that emerged are not exclusively categorised under these headings, as there are interrelationships between the items. Generally all four aspects, except the entrepreneur, are represented in the five constructs.

The constituent variables of factor I, internal organisation, include cost control, operational efficiency and skills. These items are features of the organisational resources, structure, and systems of the firm (Chrisman *et al.*, 1998). The internal organisation of the mature small firm is much simpler than in large organisations (e.g. fewer communication lines, reduced agency costs) which has been shown to be a source of small firm flexibility and offers greater opportunities to increase operational efficiency and to control costs (see Reid, 1998). The high variation in long run performance explained by this construct supports the results of Brush and Chaganti (1998) on the importance contribution of human and organisational resources to the performance of small firms occupying niches in retail industry. Cressy (1996) also highlights the importance of human capital as a determinant of firm survival.

Factor 2, industry structure and rivalry, includes cashflow, competition, growth and market positioning which reflect aspects of the attractiveness of the small firms choice of market niche. Structural features of the industry such as growth, market positioning and the level of competition influence the profit potential of the small firm (Porter, 1980). It was seen in section 3.3.1.3 that firms are more likely to survive in growing industries than in mature industries. Audretsch (1995) argued that if industry growth is positive and unanticipated, it will result in higher price cost margins thus facilitating survival. Firms with a high level of liquidity, or excess cash, have a greater ability to engage in industry rivalry, see Chrisman *et al.*, (1998). Although, Storey *et al.* (1987) found that liquidity ratios were not the best predictors of failure, generally a decline in liquidity is symptomatic of a failing company, and a rise in liquidity of a non-failing company.

Factor 3 represents attributes of the firm's business strategy. In particular it refers to the product portfolio (i.e. breath of products offered and the quality of its product offering). Reid (1993) found that having a wide range of products positively influenced the survival of the firm. Factor 4, namely resources, has only one constituent

element, namely location. A favourable location, giving a venture easy access to raw materials, customers, and suppliers is more valuable than a location chosen without such advantages in mind (Cooper, 1979). In subsection 3.3.2.5 it was found that location had a mixed effect on post entry performance. In the UK, firms located in a buoyant locality (see Storey and Wynarczky, 1996), or in accessible rural areas, experience the highest growth rates (see Storey, 1994). In other European countries, a firm's location either had no effect, or firms located in major hubs had a higher rate of survival (see Fotopoulos and Louri, 2000a; Littunen, 2000). Items loading onto factor 5 capture the dependency of the value added of the firm on customer loyalty, and on building relationship with suppliers of the firm (i.e. raising switching costs). Delinquent suppliers and debtors were shown to be a considerable threat to the survival of the small firm (Reid, 1993).

The analysis provides some underpinning to the actions, which owner-managers take to achieve the performance standards necessary for continued survival. It also lends support to models of the determinants of new venture performance proposed by Sandberg and Hofer (1987) and Chrisman *et al.*, (1998).

6.4 Predictive Power

As stated above, the multi-dimensional measure of performance provides us with a measure of performance which is common to all firms in the sample. This makes it especially useful in econometric estimation. Prior to its application in econometric estimations, correlations with objective measures of performance, age and firm size are examined. These offer further evidence in support of the utility of this long run performance measure, a measure of the fitness of the small firm to survive over the long haul.

Table 6.7 illustrates that the long run performance indicator and asset growth are negatively correlated (Pearson's R = -0.298, p-value<0.05). Thus it behaves similarly to the level of accounting net profits, which is also significantly negatively correlated with asset growth (Pearson's R = -0.747, p-value<0.0001). The long run performance indicator is weakly positively correlated with net profits in 2001. There is only a 10 percent probability in one tail that this correlation could have occurred by chance. It is also negatively correlated with the level of indebtedness of the firm, and in this instance

there is only a 5 percent probability in one tail that this correlation could have occurred by chance. Thus, in these cases, the long run performance indicator is behaving as expected. There is, however, no correlation with the rate of profitability or the sales margin at one point in time (ie. year 2001). However, the appropriateness of these criteria to judge the validity of the subjective measure of performance is questionable, given the misgivings about these measures in small firms context.

Correlations with size and age are presented in Tables 6.8 and 6.9. As it happens, none of the performance measures (objective or subjective) are correlated with age. Although Reid (1993) found age to be a positive predictor of small firm survival for a sub-sample of these firms, this related to a much early period in their lifecycle. In general, there is a negative correlation between this long run indicator of performance and size. Smaller firms are more likely to perform better, according to this indicator, than larger firms. This is indicative of a trade-off between size and performance, and this tradeoff is explored further in Chapter 9. It suggests that there is a general tendency for small firms to remain small. The correlation with headcount in 2001 was significant (Pearson's $R = -0.210$ with a two tailed p-value<0.1). There is only a 10 percent probability in one tail that the negative correlation with assets in 2001 could have occurred by chance.

Table 6.7: Correlations with Objective Measures of Performance

		Net Profit	Liabilities	Rate of profitability	Asset Growth	Sales Margin
Liabilities	Pearson Correlation	-0.012				
	Sig. (2-tailed)	*0.928*				
	N	61				
Rate of profitability	Pearson Correlation	**0.435**	-0.075			
	Sig. (2-tailed)	***0.001***	*0.567*			
	N	**60**	61			
Asset Growth	Pearson Correlation	**-0.747**	0.240	-0.101		
	Sig. (2-tailed)	***3.58E-09***	*0.122*	*0.518*		
	N	**43**	43	43		
Sales Margin	Pearson Correlation	**0.503**	-0.003	**0.663**	-0.130	
	Sig. (2-tailed)	***4.16 E-05***	*0.980*	***9.08E-09***	*0.413*	
	N	**60**	60	**59**	42	
Long run performance Indicator	Pearson Correlation	0.165	-0.208	0.0410	**-0.298**	0.115
	Sig. (2-tailed)	*0.203*	*0.103*	*0.754*	***0.052***	*0.381*
	N	61	63	61	**43**	60

Table 6.8: Correlations with Size

	Pearson's Correlation	Sig. (2-tailed)	N
Assets 2001	-0.186	0.144	63
Assets At Start-Up	-0.144	0.282	58
Actual Employees At Start-Up	-0.039	0.778	56
Actual Employees After 5 Years	-0.097	0.487	54
Actual Employees After 10 Years	-0.064	0.641	55
Actual Employees 2001	**-0.210**	**0.099**	**63**
Actual Gross Sales After 1 Year	-0.098	0.531	44
Actual Gross Sales After 5 Years	-0.103	0.510	43
Actual Gross Sales After 10 Years	-0.082	0.591	45
Actual Gross Sales 2001	-0.127	0.323	63

Table 6.9: Correlations with Age

Attribute	Pearson's Correlation	Sig. (2-tailed)	N
Long Run Performance Indicator	0.059	0.646	63
Net profit	-0.039	0.765	60
Rate of profitability (%)	0.027	0.839	61
Asset Growth (%)	0.088	0.576	43
Liabilities	-0.165	0.196	63
Sales Margin	0.019	0.884	60

Significant differences in mean long run performance indicator were not found for broad industrial sector, legal status, market reach, market position and market share. This is another redeeming feature of the multidimensional measure of performance. The measure is neither correlated with age, sector, market, nor with the organisational form of the small firm. Thus it is useful for measuring the long run performance of a heterogeneous group of small firms.

6.5 General Conclusions

This Chapter raised a number of concerns about using traditional accounting measures to capture long run performance in a small firms context. A novel measure of performance was developed, using a similar design to score-carding, see Epstein and Manzoni (eds) (2002, Part III). This new measure was based on a subjective evaluation of factors influencing the long run survival prospects of the small firm. It measures the fitness of the small firm to survive over the long haul. It was available for all the long-lived small firms, which took part in the study and thus was more compatible with the evidence base. Scores were summed across the 28 scale items representing the sorts of factors which owner-managers juggle on a daily basis. This illustrates the comprehensiveness of the measure.

From an examination of the scores on factors, it was found that mature small firms were in agreement about the contribution of suppliers, customer loyalty, quality, differentiation, product mix, diversification, operational efficiency, and skills to the long-run survival of the firm. However, there were heterogeneity in the views of owner-managers with regard to competition, substitutes, new entrants, rival's innovation, debt, regulation, credit policy and advertising. Five constructs capturing the

internal organisation, industry structure and rivalry, business strategy, resources and the nature of customers and suppliers were found to underlie this long run performance measure, using factor analytic techniques.

Although arguably not as rigourous as objective measures, the subjective measure seems to be a reasonably good surrogate. This measure was found to behave in a similar manner to the objective measures of performance. Thus, it seems that entrepreneurs act on their own evaluations. Comparing the performance of diverse firms (in terms of scale, organisational form, sector) is complex, because performance is multi-dimensional. However, the subjective measure seems useful for measuring the long run performance of a heterogeneous group of small firms. In fact the correlations, which are presented in the next chapter and the results of inferential analysis in Chapters 8 and 9 provide further assurances that as a performance measure it seems to be correctly discriminating between outcomes for the long-lived small firms.

CHAPTER 7 LONGEVITY, PERFORMANCE AND ORGANISATION

7.1 Introduction

This Chapter builds on evidence presented in Chapters 5 and 6 to complete our description of the typical long-lived small firm in the sample. Using the wealth of data gathered with the survey instrument, the discussion of the firm and market characteristics in Chapter 5 is extended to examine additional characteristics of the long-lived small firm. Specifically, this Chapter considers aspects of the mature small firm's competitive strategy (e.g. market positioning and innovation) and it describes the evolution of the internal organisation of the firm (e.g. engagement in new activities and technological progressiveness). It also analyses key organisational changes (e.g. changes in ownership, capacity etc.), which occurred over the life of the firm and desired end-games of owner-managers. Where appropriate, these characteristics are related to measures of firm growth, objective measures of performance and the novel long run performance indicator (i.e. a subjective measure of performance, see Chapter 6). Such an analysis highlights factors which are likely to promote the post entry performance and growth (see Chapter 3). The characteristics are also related to firm age, to identify factors which are likely to foster the longevity of the small firm.

Thus, this Chapter contributes to the literature by testing existing hypotheses on entrepreneurial intentions, market positioning, size of competitive strategy space, product and process innovation, internal organisation and information technology, using new data on long-lived small firms. Moreover, in conducting this analysis, it identifies factors which are likely to influence the longevity, growth and performance of mature small firms in Scotland. This identifies routes or paths, which are expected to advance the performance and the longevity of the small firm. Knowledge of the prescribed paths, which are liable to foster longevity, is useful in educating new small firm start-ups. In addition, it discusses the importance, nature and timing of key organisational changes (Smallbone *et al.*, 1992, 1995) and attributes of planned end-games of long-lived small firms (Tajnikar and Došenovič, 2003), issues, which have received scant attention in the past.

This Chapter also completes our reference point for understanding the results of the econometric analysis discussed in Chapters 8 and 9. The discussion on the key organisational changes feeds into Chapter 8, which examines the flexibility of the small

firm in responding to organisational change. The discussion on the competitive strategy space of the long-lived small firm feeds into Chapter 9. The latter variable is determined jointly with size and performance in a simultaneous equation system. The analysis presented in this Chapter is also complemented by the case analysis presented in Volume II, Appendix 5.

A similar array of univariate and bivariate statistical techniques to those adopted in Chapter 5 are applied to test inferences in accordance with small sample distribution theory. Here again, rather than examining marginal organisational changes at each sequential stage of development, a comparison of the characteristics of the firm early in its lifecycle and as a long-lived small firm are examined.

The discussion is structured as follows: Section 7.2 portrays the mature small firm's competitive strategy. A similar analysis for the internal organisational structure of the firm is performed in Section 7.3. In Section 7.4, key organisational changes, which occurred in the operations of the typical small firm over its lifetime, are described. Family succession, intergenerational issues and factors influencing the mature small firm's end-game strategy are discussed in Section 7.5. Finally, Section 7.6 discusses the findings of this Chapter.

7.2 Competitive Strategy

'Strategic choice' is the commitment to undertake one set of actions rather than another (Oster, 1990). This commitment necessarily describes the allocation of resources, and thus involves making trade-offs (Porter, 1996). These strategic choices are path dependent. The set of actions undertaken in the past determine the production possibilities available in the future (Antonelli, 1997), and are referred to as the small firm's 'strategic legacy' by Roper (1998).

Business strategies adopted by small firms are likely to be different from business strategies adopted by large firms, due to factors such as economies of scale, differences in organisational structure and product mix (see Prince and Thurik, 1995; Variyam and Kraybill, 1994; Bradburn and Ross, 1989). There is evidence that business strategies adopted by small firms are relatively diverse (Love *et al.*, 1995). Studies show that small firms engage in small-scale R&D work (Kleinknecht *et. al.*, 1991; Acs and Audretsch,

1987, 1988), product and process innovation, and act to acquire new technical knowledge (Link and Bozeman, 1991; Variyam and Kraybill, 1994; Roper, 1998). Reid, Jacobsen and Andersen (1993) found that small firms at inception actively seek, and develop, focus strategies to serve particular geographic, customer and/or product niches.

The motivation of the owner-manager for establishing the business has been linked to the performance and the survival of the small firm (Reid and Smith, 2000a). The pervasive influence of the owner-manager of the firm, his dominance in making decisions, and the consequences of both of these factors for firm performance is discussed by Van Gelderen *et al.* (2000). In this Section, the expectations of the owner-managers, at start-up (or purchase) and at the time of interview, are examined. Then the mature small firm's choice of market positioning, competitive tactics and its level of innovation are considered.

7.2.1 Aims & Expectations

Formal theories of entrepreneurship, like Blanchflower and Oswald's (1990), emphasise that rational goals for establishing a new business may go beyond pecuniary considerations, to nonpecuniary considerations, such as a desire for autonomy and control. The personal values of the entrepreneur can influence how vigorously the owner-manager wants to grow on his firm or whether he wishes to close down his firm. Reid and Smith (2000a) found that of the numerous aims that owner-managers adopt (survival, growth etc.), only one appears to have a major impact on performance; the pursuit of a high rate of return on investment.

The long-lived small firms were asked to identify their chief aims for their business at start-up, and their main reasons for continuing to operate the business in 2001, from the categories listed in Table 7.1 below. Two fifths (39.7%) of the owner-managers hoped that the business would survive; a fifth (19%) of the owner-managers set up the firm to provide them with a source of employment; and few (2%) of owner-managers indicated that they set up the firm to obtain a high rate of return on their investment. While *"the narrow...economic pursuit of the best rate of return on investment"* (Reid and Smith, 2000a, p. 165) had a positive impact on the performance of business start-ups in Scotland, the desire to create a business with 'survival prospects' seems to be more typical of the sample of long-lived small firms. The long run test of economic survival ($\pi \geq 0$) is perhaps

linked to the rate of return on investment. It could be classified as a positive motive rather than a negative one like setting up a business as an alternative to unemployment (Storey, 1994). Only a tenth (9.5%) of owner-managers wished to pass the business on to family members. Rather than suggesting a lack of desire, or competence, of offspring to take over the running of the business, this perhaps indicates that the transfer of the wealth generated by the business within the family is not foremost on the mind of entrepreneurs in setting up these firms.

Table 7.1: Aims For Business at Start-up and 2001

Motivation (Start-up)	N (%)	Motivation (2001)	N (%)
To provide you with an alternative to unemployment	12 (19%)	To provide you with employment to the end of your working life	25 (39.7%)
To have a business to pass on to family members	6 (9.5%)	To have a business to pass on to family members	6 (9.5%)
To create a business with survival prospects	25 (39.7%)	To create employment in the community	2 (3.2%)
Short term profit	1 (1.6%)	For long term profit	1 (1.6%)
Long term profit	3 (4.8%)	For further growth	1 (1.6%)
Growth	4 (6.3%)	To get a return on the business	6 (9.5%)
High sales	1 (1.6%)	To increase the value of the business on trade sale	10 (15.9%)
High rate of return	1 (1.6%)	To have a sizeable nest egg on retiring	5 (7.9%)
To sell on the business	1 (1.6%)	Other	7 (11.1%)
Other	9 (14.3%)		

There was a change in the motivation of owner-managers from start-up to the time of interview. While the employment of the owner-manager was still of foremost importance [two-fifths (39.7%) of the owner-managers chose this option], the conversion of private equity into funds for the retirement was of next importance. A third (33.3%) of the owner-managers were considering the value of the business on trade sale (or on another

end-game); a tenth of the firms (9.5%) wished to get a return on the business; a sixth (15.9%) wished to increase the value of the business on trade sale; and eight percent (7.9%) wished to have a sizeable nest egg on retiring.

The relativist approach to performance measurement assesses whether the goals of the owner-manager for the business were achieved (Reid and Smith, 2000a). Almost ninety percent (87.3%) of firms stated that the business met their performance expectations. This is perhaps true, given that their chief intention at start-up was to create a business with survival prospects. Small firms whose expectations were not met, received a significantly lower mean performance rating of 59, in comparison to 69 for those whose expectations were met, according to the long run performance indicator (T statistic=3.516, 61d.f., p-value=0.001)

Nearly half (44.4%) of the owner-managers of long-lived small firms stated that they did not plan for the business at start-up. Those that did plan had a similar length of planning horizon of 14 months to the mean value of 151/2 months found by Reid and Smith (2000a). Less than half (43%) of the owner-managers set future targets (for sales and employee growth etc.) for the business at start-up. However, most of the firms (54%) at start-up believed that the firm would continue to trade indefinitely.

7.2.2 Market Positioning

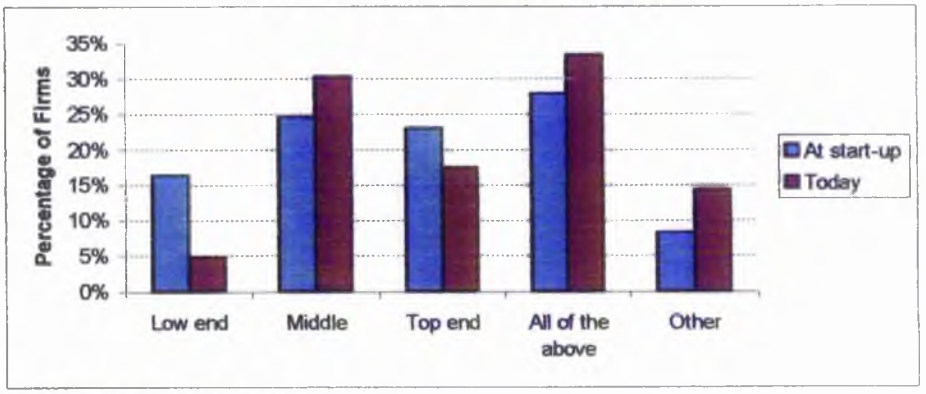
Porter (1996) described the market position of a firm as a function of the needs it serves (i.e. narrow or broad), and the variety of customers it serves (i.e. cost or differentiation or both) and access to customers (i.e. density of customers). Reid (1993, p. 119) claimed Porter's (1985) focus strategy was "*most likely to offer the SBE a competitive advantage*". In Subsection 5.3.2.2, we found that the vast majority of long-lived small firms in the sample pursued a differentiation strategy. This corroborates Reid's (1993) findings, evidence from Bradburn and Ross (1989), and the findings of Wright *et al.* (1995) and Carter *et al.* (1994). Caplin and Nalebuff (1986) illustrate that a high cost producer, by occupying positions well away from the centre of the market, may be able to avoid negative competition with its low cost rival and assure itself a market niche.

Market positioning was measured by a categorical variable, where firms self-reported their market positioning as the 'low', 'middle' and 'top' end of the market. Almost

half (47.9%) served the middle-to-top end of their market, confirming evidence found by Bradburn and Ross (1989) and Reid (1993). Small firms pursue 'focus' or 'niche' based strategies to compete successfully in the market with larger rivals. The other half of the long-lived small firms (48%) stated that they served all segments of their market. Typically, their products are customised. Less than five percent (4.8%) of long-lived small firms solely served customers in the low end of the market, compared to sixteen percent at start-up. To survive in the long run, it is difficult for the small firm to compete on costs. Failure to achieve economies of scale in production hinders their ability to attain a long-term competitive advantage in such a position.

There is some evidence that these small firms learned early in their life that is was difficult to compete in a low cost segment (see Figure 7.1). Two-fifths of firms (39.7%) changed their market positioning. Now they serve more premium ends of the market (i.e. middle to top ends). A test of the null hypothesis of equality between the mean ranked market positioning at start-up and in 2001, was rejected using Wilcoxon Signed Rank Test (Z statistic=-2.863, p-value<0.005; see Table 5.10 above). A Sign test confirmed this result also (p=0.019<0.05 using the binominal distribution).

Figure 7.1: Market Positioning

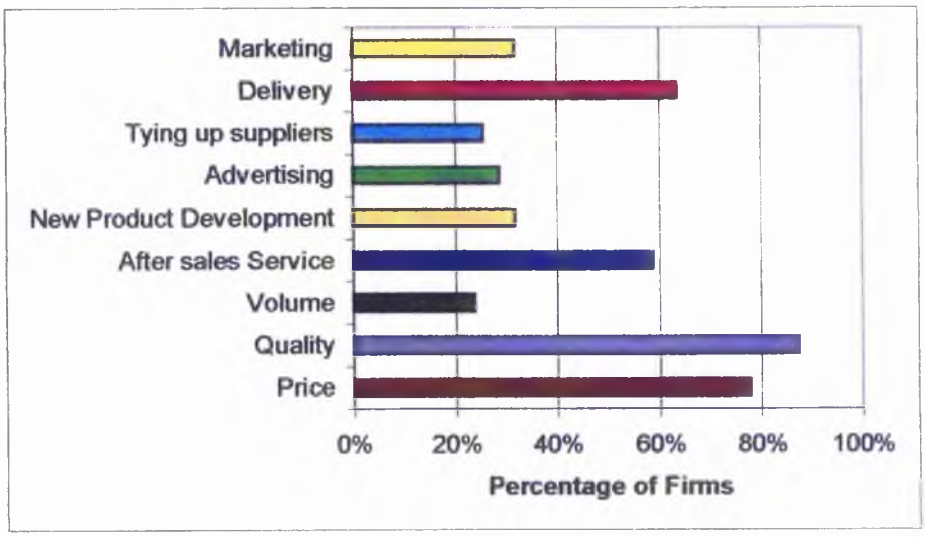


Note: Today represents the year 2001

To pursue a focus or niche-based strategy, the long-lived small firm competes on a number of dimensions (price and non price). Essentially, the higher the number of dimensions upon which the small firm competes, the wider is its competitive strategy space and the greater is its willingness to compete. A wider competitive strategy space is

characteristic of a differentiation strategy. The competitive strategy space of the small firm was calibrated by a count of the number of forms of competition used by the firm.[1] It ranged from 1 to 8 where '1' indicated that the small firm competes based on just one dimension of the competitive strategy space (e.g. price alone), and '8' indicated that the small firm has a large competitive strategy space and therefore competes across many dimensions (e.g. price, quality, delivery). On average, the long-lived small firms competed on 4.5 dimensions. Over three-quarters (78%) of them competed on price, 87% on quality, 58% on after sales service and 63.5% on delivery. It was less common to compete on advertising (28.6%), tying up suppliers (25.4%) and volume (23.8%). Figure 7.2 illustrates the percentage of firms, which use different forms of competition.

Figure 7.2: Forms of Competition



There was no significant difference found in the mean size of the competitive strategy space for various levels of intensity of competition ($F_{(3,59)}$ statistic=0.127, p-value=0.944) or for various market positions ($F_{(4,58)}$ statistic =0.501, p-value=0.735). A diverse competitive strategy space is adopted across all market positions. Thus, it is perhaps not the number of methods of competition used, which determines the intensity of competition, but the vigour with which these are used. A significant difference was found

[1] To measure this variable, the owner-managers were asked: "What form of competition is used in your principal market?" Response options included price, quality, volume, after sales service, new product development, advertising, tying up suppliers, delivery and marketing (see Subsection 4.3.2).

in the mean size of the competitive strategy space for a variety of levels of differentiation ($F_{(3,57)}$ statistic =3.42, p-value=0.023). Long-lived small firms, which have identical products to rivals, compete on 3.6 dimensions; with similar products they compete on 4.26 methods; and with different products to rivals they compete on 5.5 methods. The size of the competitive strategy space was related to the long run performance indicator (Pearson's R=0.274, p-value=0.03<0.05). Thus, niche-based strategies are likely to increase the long run prospects of the firm. The joint determination of this variable, size and performance is analysed in a three equation simultaneous system in Chapter 9. It should be noted that neither market positioning, nor the size of the competitive strategy space, were directly correlated to firm growth (e.g. sales, employee or asset growth), nor other objective measures of performance (e.g. rate of profitability).

From the analysis above, it was found that long-lived small firms serve customers near the top end of the market. They compete on a number of dimensions to differentiate their product offering from those of rivals. The more differentiated the product offering of the long-lived small firm (i.e. the larger the competitive space), the higher is the likely long-run prospects of the small firm.

7.2.3 Innovation

While large firms may concern themselves with fundamental product and process innovations, small firms are disproportionately responsible for initial diffusion and near-to-market development activities (Freel, 2000b). In any case, almost 90 percent (87.5%) of the firms interviewed stated that they had engaged in product innovation since start-up.[2] A similar percentage (92.3%) stated that they had engaged in process innovation since start-up.

There is variation in the intensity with which long-lived small firms engage in product and process innovation. In the former case, approximately half (47.6%) of the long-lived small firms interviewed claimed they developed 1-5 new products; over a tenth (11.1%) developed 6-10 products; eight percent (7.9%) developed 11-20 products and a

[2] This is distinct from fundamental innovations at start-up. A third (33.3%) developed new products and services; approximately another third (30.4%) made quality improvements to existing products on the market. A smaller proportion identified new technologies (3.6%), marketing (10.7%) and operational efficiency (14.3%) as the principal form of innovation.

fifth (20.6%) developed more than 20 new products. Thus, only a fifth of the sample claimed to engage in a considerable level of product innovation (i.e. > 20 new products) whereas approximately half the sample engaged in product innovation on a minor scale (i.e. <5 new products). The level of process innovation was bimodal; a third (33.3%) of the small firms stated that there was a significant change in their processes since start-up and an additional third stated that there was important change in their processes over this period.

The intensity of product and process innovation increases with firm size (as measured by turnover and full-time equivalent employees in 2001) confirming the findings of Huiban and Bouhsina (1998), Brouwer and Kleinknecht (1995), and Bhattacharya and Bloch (2004)[3]. The latter two studies found that the extent of innovation increases less proportionately with firm size. Acs and Gifford (1996) show that improvement of existing product lines reduces the effect of firm size on new product innovation. We are unable to test this hypothesis for this sample of long-lived small firms.

Geroski and Machin (1992) argued that the process of research and development is likely to create persistent differences in the performance of innovators and non-innovators rather than any increased sales generated from the product innovations. They contend that the process of research and development is liable to increase the small firm's external absorptive capacity (Cohen and Levinthal, 1990; Levinthal, 1996) and relatedly its internal knowledge base – leading to greater flexibility and adaptability. Table 7.2 presents statistical tests of association between product and process innovation and age, as well as different measures of growth and performance, using Kendalls Tau_b. There is a significant positive correlation between the extent of process innovation and age (Kendalls Tau_b=0.227, p-value < 0.05). This finding indicates that older firms ranked the extent of their process innovation higher than younger firms, which in turn indicates that internal knowledge of sources of efficiencies in the processes of the small firm increases with age.

[3] The correlations between full-time equivalent employees and product innovation (Kendalls tau_b = 0.210 at two-tailed p-value =0.031) and between full-time equivalent employees and process innovation (Kendalls tau_b = 0.237 at two-tailed p-value =0.016) were weakly positive and significant at the five percent level. Similarly, the correlations between turnover and product innovation (Kendalls tau_b = 0.174 at two-tailed p-value =0.073) and between turnover and process innovation (Kendalls tau_b = 0.241 at two-tailed p-value =0.031) were weakly positive and significant at the ten percent level or lower.

No significant relationship was found between the extent of product innovation and age, though the sign on the Kendalls Tau_b was positive.

Table 7.2: Kendalls Tau_b Correlation Coefficients between the extent of Product and Process Innovation and Measures of Growth and Performance

	Product Innovation			Process Innovation		
	Kendalls Tau_b	Sig. (2-tailed)	N	**Kendalls Tau_b**	Sig. (2-tailed)	N
Age	0.158	*0.105*	63	0.227**	*0.021*	63
Rate of Profitability	-0.128	*0.192*	61	0.059	*0.555*	61
Asset Growth *(life)*	0.275**	*0.018*	43	0.307*	*0.010*	43
Employee Growth *(life)*	0.176	*0.089*	56	0.219**	*0.036*	56
Sales Growth *(life)*	-0.014	*0.904*	44	0.144	*0.219*	44
Labour Productivity Growth *(life)*	-0.12	*0.300*	44	-0.142	*0.227*	44
Long Run Performance Indicator	-0.016	*0.864*	63	0.071	*0.466*	63
Product Innovation	1	.	63	0.110	*0.309*	63
Process Innovation	0.11	*0.309*	63	1	.	63

**Correlation is significant at the 0.01 level (2-tailed).*
***Correlation is significant at the 0.05 level (2-tailed).*

A number of studies of small firm innovation (Roper *et al.,* 1996; Roper, 1997; Wynarczyk and Thwaittes, 1997; Huenks, 1998; and Freel, 2000a) found a strong positive correlation between product innovation and turnover growth and between product innovation and performance (Wynarczyk and Thwaittes, 1997; Geroski and Machin, 1992). Here, a significant positive relationship is found between the extent of product innovation and asset growth (Kendalls Tau_b=0.275, p-value<0.05). Thus, increases in the wealth of the firm are weakly, positively correlated with the extent of product innovation. Employment growth is also weakly correlated with product innovation but only at the 10% significance level. Similarly, the extent of process innovation is significantly positively correlated with asset growth (Kendalls Tau_b=0.307, p-value<0.05) and it is also

significantly and positively correlated with employee growth (Kendalls Tau_b=0.219, p-value<0.05). It seems that important changes in processes need a greater division of labour (e.g. as encouraged by a larger 'headcount'). Even though the correlation is weak, it nevertheless supports Freel's (2000b) findings; that innovators tend marginally towards greater internal control. Neither the rate of profitability nor the long run indicator of performance is correlated with either measure of innovation.

Lifetime sales growth was not significantly correlated with the extent of product or process innovation, which is contrary to recent findings by Freel (2000a); Wynarczyk and Thwaittes, (1997); Roper, (1997); and Roper *et al.*, (1996). By contrast, there was equivocation in these studies concerning the relationship between product innovation and employment growth found above. An explanation for the former is provided by the findings of Geroski and Machin (1992), where the effect of new product innovation merely has a transitory influence on sales.[4] According to Dosi (1988), the rewards to innovation are likely to persist, in so far as the firm is able to exert property rights, or effectively employ other appropriability devices (e.g. learning curves, secrecy, first mover advantages etc). Once the firm loses proprietary control over new knowledge, its influence on sales fades. Less than a quarter (22.2%) of mature small firms were able to protect their product innovations using trademarks, copyright and patents etc. This may explain the lack of a relationship between innovation and lifetime sales growth, and perhaps the lack of a relationship between innovation and the long-run performance indicator.

The typical long-lived small firm stated that approximately half their rivals engaged in product innovation (45.1%) and a half in process innovation (50.9%). However, most small firms felt little or no competitive pressure, from the product (72.4%) or process innovations (72.1%) of rivals. This is not surprising, as most small firms have '*a live and let live'* philosophy towards rivals in their markets, see Reid *et al.*, (1993).

[4] Typically, the owner-managers (86.5%) of the long-lived small firms stated that they reaped rewards (i.e. increased market share and profits) from developing product innovations; approximately half (45.5%) stated they reaped a lot of rewards.

7.2.4 Conclusions

Over the life of the small firm, the expectations of the owner-manager changed from aiming to create a business with survival prospects, to the consideration of more pecuniary motives (e.g. having a 'nest egg' on retiring). In order to survive, the small firms cultivated market niches and engaged in product customisation strategies. They learned early–on the difficulties associated with competing solely at the low end of the market. Therefore they altered their strategies to serve the more premium ends of the market, where it was easier to create 'value/price' for customers. The more differentiated the strategy, the larger is the competitive strategy space.

Certainly, it seems that long-lived small firms are not smaller clones of the larger incumbents, but rather serve as agents of change through innovative activity (see Audretsch, 1995). Innovative activity influenced asset growth and employment growth within these mature small firms, but did not influence the long run performance indicator or lifetime sales growth. Difficulties in asserting intellectual property rights over near to market innovations may explain this.

7.3 Internal Organisation

In this Section, changes in the extent of the long-lived small firm's administrative organisation are examined over the life of the firm. The technological progressiveness of the operations of the firm is also discussed.

7.3.1 The Scope of the Administrative Organisation

Penrose (1995) viewed the 'coherent administrative organisation' as the coordination mechanism for the services of the physical and human resources of the firm. The internal organisation of the resources of the firm renders their services more or less productive. As firms grow in size, they reorganise their resources, acquire new ones, some become more specialised and others become idle (Penrose, 1959). Firm growth, according to Ghoshal *et al.* (2000), involves a re-organisation or re-bundling of the activities of the firm, internalising the various stages of the value chain. Over stages of organisational development, changing resource combinations often require different management practices for continued success (Miller and Friesen, 1984; Kazanjian, 1988b).

The scope of the small firm's organisation is approximated by a count of the various stages of the value chain that is; by a count of the functional activities (e.g. production, accounting, I.T. support, sales, marketing, product innovation, strategic planning etc.) of the firm. The variable ranges from three to eleven roles where a value of '3' represents a low level of internal organisation and a value of '11' represents a firm where a large number of functions are performed internally. On average, the mature small firm engaged in seven functional activities at the time of interview. This average of seven functional activities, increased significantly from the average of five functional activities performed at start-up (examined using a Paired Sample T test $T = -7.497$ at $p<0.0001$; see Table 7.3).

At start-up, the long-lived small firm concentrated on the primary activities of production and sales. The accounting function supported these activities. Over half the firms in the sample engaged in after sales service (60.3%) and the training of staff at that time (57.8%). Extensions to the value chain occurred in the support functions of the firm (see Table 7.3). A McNemar test of the null hypothesis; that equal proportions of mature small firms engaged in each functional activity at start-up and the time of interview, was rejected (p-value <0.05 in one tail) for activities such as the training of staff, computer support systems, market research, innovation and strategic planning. This confirms Romano and Ratnatunga's (1994) findings that the functions of planning and control are increasingly important as the firm grows.

The scope of the small firm's administrative organisation at the time of interview was significantly dependent on the scope of its administrative organisation at start-up (Pearson's $R = 0.56$, p-value<0.0001; see Table 7.4). This provides tentative evidence that the scope of the administrative organisation of the small firm is contingent or dependent on the small firm's stock of inherited resources at start-up. Thus, the scope of the administrative organisation at start-up may have a long-lasting influence.

Table 7.3: Internal Organisation

Activity	Start-up	2001	McNemar Test
Accounting	52 (82.5%)	56 (88.9%)	0.289[b]
Training	37 (57.8%)	57 (90.5%)	0.000[b]
Computer Support Systems	5 (7.9%)	49 (77.8%)	42.023[a] (0.000)
Production of Product/Service	59 (93.7%)	59 (93.7%)	1.000[b]
Sales	60 (95.2%)	61 (96.8%)	1.000[b]
Market Research	20 (31.7%)	32 (52.5%)	0.008[b]
Innovation	24 (38.1%)	40 (63.5%)	0.000[b]
Strategic Planning	24 (38.1%)	38 (61.3%)	0.001[b]
After Sales Service	38 (60.3%)	43 (69.4%)	0.063[b]
Legal Matters	17 (27%)	19 (30.2%)	0.727[b]
Extent of Value Chain	5.381[c] (2.0746)[d]	7.2623[c] (2.1672)[d]	-7.497[e] (0.000)

Notes:

a Continuity corrected
b Binomial distribution used.
c Mean
d Standard Deviation
e Paired Sample T test

The age of the small firm at the time of interview, however, was negatively related to the scope of the administrative organisation at start-up (Pearson's R = -0.33 p-value=0.01; see Table 7.4). Older small firms in the sample tended to have a smaller administrative scope at start-up. A potential reason for this is perhaps the rarity of PCs, enterprise training etc. at the inception of these older firms (i.e. a cohort effect). This influenced the scope of the organisational structure of these firms later in their lives; older firms in the sample also tended to have a smaller administrative scope (Pearson's R = -0.22,

p-value<0.05 in one tail; see Table 7.4) at the time of interview. Brush and Chaganti (1998) found that older small retailers did not exhibit a significant evolution in their organisational systems, planning horizons and staff skills. They put this down to the 'hands on' approach characteristic of smaller retail companies.

Table 7.4: Pearson's R Correlation Coefficients between the Scope of the Administrative and Measures of Growth, Performance and Age

		Administrative Organisation			Administrative Organisation		
		2001			*Start-up*		
		Pearson Correlation	Sig. (2-tailed)	N	Pearson Correlation	Sig. (2-tailed)	N
Administrative Organisation	***2001***	1	-	63	**0.565***	**1.44E-06**	63
	Start-up	**0.565***	**1.44E-06**	63	1	-	63
Rate of Profitability		-0.095	0.468	61	-0.043	0.744	61
Long-run Performance Indicator		-0.045	0.727	63	-0.006	0.960	63
Asset Growth *(life)*		0.216	0.165	43	-0.192	0.219	43
Employee Growth *(life)*		**0.330****	**0.013**	56	-0.046	0.735	56
Sales Growth *(life)*		0.178	0.247	44	-0.046	0.765	44
Labour Productivity Growth *(life)*		-0.151	0.328	44	-0.02	0.890	44
Age (2001)		-0.228	0.072	63	**-0.334***	**0.007**	63

Notes:
**Correlation is significant at the 0.01 level (2-tailed).*
***Correlation is significant at the 0.05 level (2-tailed).*

Growth in size over the life of the small firm, as measured by full-time equivalent employees, was significantly positively related to the scope of the administrative organisation at the time of interview. Small firms, which experienced higher growth in headcount, also tended to increase the scope of the administrative organisation of the small firm (Pearson's R = 0.33, p-value<0.05). There was no relationship between the scope of the firm's administrative organisation and the other measures of growth or performance.

The absence of a significant relationship and the negative sign on correlations with the rate of profitability and the long run performance indicator is tentative evidence in support of Reid's (1995) findings. He found that increasing the organisational complexity (approximated by business type) of SBEs reduced performance. However, a test of the null

hypothesis of equivalence in the mean scope of the administration organisation across businesses types (i.e. sole traders, partnerships and private companies) could not be rejected using a one-way analysis of variance test (see Table 7.5). This runs contrary to expectations as private companies were found to have more complex organisational structures, see Reid (1998). This result is particularly surprising as these private companies are significantly bigger in size (see Table 5.5). However, Hall (1995) argued that influences other than growth, such as age, internal politics or factors external but not reflected in their growth rates, may be contributing to change in organisational form. Contingency theory emphasised the influence of factors such as technological uncertainty on changes in organisational form (see Donaldson, 1994).

Table 7.5: ANOVA of Legal status and the Scope of the Administrative

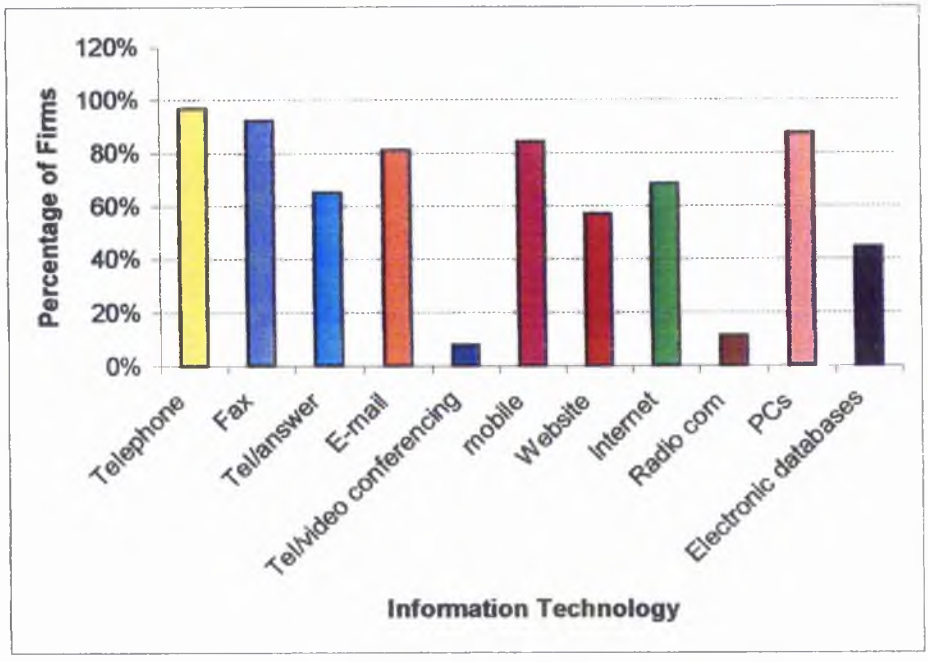
	Administrative Organisation			**Administrative Organisation**		
	Start-up			***2001***		
Legal status	Sole Trader	Partnership	Private Company	Sole Trader	Partnership	Private Company
N	*16*	*19*	*28*	*16*	*19*	*28*
Mean	5.375	5.053	5.607	7	6.737	7.714
Df1			*2*			*2*
Df2			*60*			*60*
Fstat			.397			1.330
P-value			.672			.272

There is significant evolution in the scope of the administrative organisation of the small firm as it ages. The firm engages in functional activities such as market research, innovation and planning etc. As discussed in section 2.3.1, lifecycle models (such as Greiner, 1972; Churchill and Lewis, 1983) are normally concerned with internal changes that occur as the firm grows in size. A positive relationship between the scope of the administrative organisation and growth in firm size offers tentative evidence in support of such models in contrast with the findings of Kazanjian (1988b) and Birley and Westhead (1990). However, its relationship with age is complex; older firms have smaller administrative organisations in comparison to younger firms. Thus, the lifecycle effect is non-linear.

7.3.2 Technological Sophistication

Reid (2000) considers information as being a precious resource. Skills in acquiring real time information reduce risk and uncertainty and improve the adaptability of the internal organisation to changes in its environment. Lybaert (1998) demonstrated that greater information use in SMEs was associated with better performance and was found to be positively associated with factors like strategic awareness, growth orientation and delegation.

Figure 7.3: Level of Information Technology



On average, long-lived small firms use seven (2.34) forms of information technology (I.T.) (with the corresponding standard deviation in parentheses). Figure 7.3 illustrates the percentage of firms, which used various information technologies. Over half the small firms used: telephone (96.8%); fax (92.1%); personal computers (87.3%); E-mail (81%); mobile phone (84.1%); internet (68.3%); telephone answering (65.1%); and a website (57.1%). The permeation of information technology within the internal organisation of the firm and the introduction of I.T. into the day-to-day running of the business may differ across industries, as some firms are more progressive in the adoption of

new technologies than others. However, a test of the null hypothesis of the equivalence in the mean count of information technologies across broad industrial sector could not be rejected (see results of ANOVA presented in Table 7.6). Thus, there is tentative evidence that manufacturing and services firms use similar levels of I.T. Younger firms were significantly more likely to possess more forms of information technologies (Pearson's R=0.35, p-value<0.05; see Table 7.7). Furthermore, long-lived small firms, which possess a larger number of forms of I.T. had broader administrative organisations. The scope of the administrative organisation at start-up and at the time of interview was significantly positively correlated with the number of forms of I.T. available to the firm (see Table 7.7). Small firms with a wider administrative organisation embraced I.T. and had perhaps greater needs for timely information.

Table 7.6: ANOVA of Sector and Information Technology

	Count of I.T.		Count of I.T. Uses	
Sector	Manufacturing	Services	Manufacturing	Services
N	*23*	*40*	*23*	*39*
Mean	7.608	6.925	5.044	4.231
Df1		*1*		*1*
Df2		*61*		*60*
Fstat		1.387		1.792
P-value		0.244		0.186

Smith (1999) found that mere belief in the importance of information technology is not directly related to the performance of a sample of 150 new business starts. High-perceived importance of I.T. for each performance group was especially strong amongst the better performers though. In the sample of 63 long-lived small firms, over half (54%) of the firms indicated that information technology was very important to their business; a third (36%) indicated that it was important; and a tenth (10%) indicated that it was unimportant to their business. The mean count of information technologies differed significantly across the small firms perceived views of the importance of I.T. [$F_{(2,60)}$ statistic =7.031, p-value=0.002]. The small firm with a low perceived view of I.T. importance possessed, on average, five (2.58) forms of I.T.; seven (1.31) with a medium perceived view; and eight (2.931) with a high perceived view of I.T. importance (associated standard deviations in

parentheses). However, as found by Smith (1999), there was no significant difference in mean performance for higher levels of perceived importance of I.T. (see Table 7.8). In fact, a higher count of information technologies was significantly negatively correlated with the long run performance indicator (see Table 7.7). Ordinarily, greater use and absorption of I.T. would be positively correlated to performance (see Smith, 1999) but given that the vast majority of these small firms were set up prior to the general use of PCs in business, this divergent result is not surprising[5]. Even though younger firms were more likely to possess more forms of information technology (see Table 7.7), there was no significant difference in the mean age for firms, which differ in the perceived importance of information technology (see Table 7.8).

Table 7.7: Pearson's R Correlation Coefficients and Information Technology

		Count of I.T.			Count of I.T. Uses		
		Pearson Correlation	**Sig. (2-tailed)**	**N**	**Pearson Correlation**	**Sig. (2-tailed)**	**N**
Count of I.T.		1	.	63	**0.707***	**4.55E-11**	62
Count of I.T. Uses		**0.707***	**4.55E-11**	62	1	.	62
Age (2001)		**-0.353***	**0.005**	**63**	**-0.336***	**0.008**	**62**
Administrative Organisation	***2001***	**0.466***	**1.2E-4**	**63**	**0.417***	**7.0E-4**	**62**
	Start-up	**0.296****	**0.018**	**63**	**0.250****	**0.050**	**62**
Asset Growth *(life)*		0.255	0.097	43	0.230	0.144	42
Employee Growth *(life)*		0.167	0.219	56	**0.321***	**0.017**	**55**
Sales Growth *(life)*		0.229	0.135	44	0.295	0.055	43
Labour Productivity Growth *(life)*		-0.054	0.728	44	-0.186	0.231	43
Rate of Profitability		.037	0.780	61	0.095	0.47	60
Long-run Performance Indicator		**-0.303***	**0.016**	**63**	-0.215	0.093	63

Notes:
* Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed).

[5] This result is also consistent with Mitchell *et al.* (2000) who found that intensive use of I.T. could be a response to poor performance.

Table 7.8: ANOVA of Perceived Importance of I.T. and Age and Performance

Performance Measure	Perception of I.T.	N	Mean	Df_1	Df_2	F Statistic	Sig.
Rate of Profitability	Unimportant	5	0.104				
	Important	22	0.292	2	58	0.527	0.593
	Very important	34	0.388				
	Unimportant	6	65.56				
Long-run Performance Indicator	Important	23	68.55	2	60	0.458	0.635
	Very important	34	66.85				
Asset Growth (life)	Unimportant	4	23385				
	Important	16	1421	2	40	0.520	0.598
	Very important	23	35099				
Employee Growth (life)	Unimportant	6	77.78				
	Important	19	497.74	2	53	0.574	0.567
	Very important	31	499.90				
Sales Growth (life)	Unimportant	4	24.84				
	Important	15	321.94	2	41	2.202	0.124
	Very important	25	613.47				
Labour Productivity Growth (life)	Unimportant	4	-5.200				
	Important	15	63.37	2	41	0.405	0.670
	Very important	25	26.48				
Age	Unimportant	6	34.5				
	Important	23	27.04	2	60	1.571	0.216
	Very important	34	22.94				

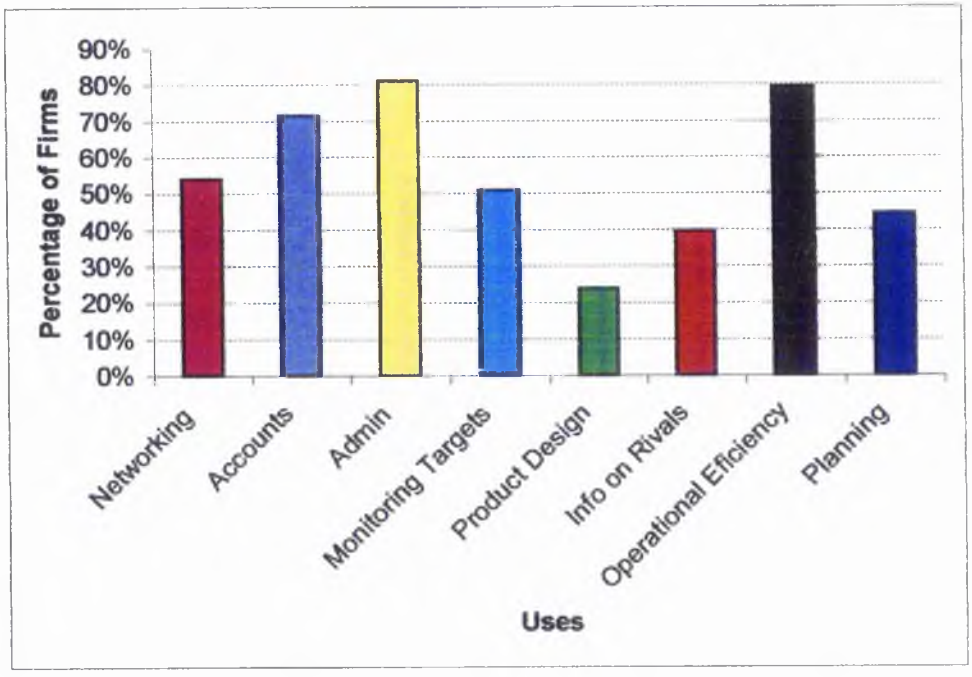
The number of information technologies and the activities for which information technologies were used within the firm were significantly correlated as expected (Pearson's R=0.71, p-value<0.0001; see Table 7.7). On average, long-lived small firms used information technology for 4.5 (2.35) activities within the firm (standard deviation in parentheses). Over half of the firms employed information technologies for networking (57.1%), producing accounts (71.4%), managing dealings with buyers and suppliers (81%), monitoring performance targets (50.8%) and improvements in operational efficiency (79.4%) (see Figure 7.4 below). In a similar manner, the mean count of uses of information technologies differed significantly across the small firm's perceived view of I.T.

importance [$F_{(2,60)}$ statistic = 11.5 at a p-value=0.0001]. The small firm employed I.T. for one (0.82) activity, four activities (2.09) and five (2.11) activities for low, medium and high-perceived views of the importance of I.T. respectively (standard deviations in parentheses). Actual use of information technologies was related to firm growth, as measured by fulltime employees (Pearson's R =0.32, p-value<0.05; see Table 7.7) and sales growth (Pearson's R =0.30, p-value <0.1; see Table 7.7). The introduction of information technologies into the activities of the firm is more significant for growth in size (as measured by sales and FTEs) than the perceived importance of I.T. This supports the findings of Smith (1999) and Storey (1994).[6]

A test of the null hypothesis of equivalence in the mean uses of technologies across broad industrial sectors could not be rejected (see results of ANOVA presented in Table 7.6). Younger firms were significantly more likely, to employ more forms of information technologies, for more activities within the firm (see Table 7.7). Furthermore, the scope of the administrative organisation at start-up and at the time of interview was also significantly positively correlated with the count of activities for which I.T. was used (see Table 7.7). Small firms with a wider administrative organisation had perhaps greater needs for formal reporting systems to monitor performance and operational efficiency.

[6] Storey (1994) suggested that there are tentative indications that technological sophistication is positively associated with rapid firm growth.

Figure 7.4: Uses of Information Technology



Industry-wide technical change has an important effect on promoting the long run survival prospects of the firm. Winter (1984) and Gort and Klepper (1982) show that the technological and knowledge situation affect the relative smoothness with which new firms are able to innovate and therefore survive (see Subsection 3.3.1.2). Four-fifths (82.5%) of the firms interviewed experienced technical change in their industry over the life of their firm. A significant difference was found in the mean count of forms of information technology and in the mean number of activities for which I.T. was employed (see Table 7.9) in industries which experienced technical change as opposed to those which did not. Thus, the level of technical change in the industry is a more important factor in explaining the adoption and use of I.T. as opposed to broad industrial sectors. Typically, this technical change was instigated within the industry. Almost two-fifths (38%) of the long-lived small firms stated that newly emerging innovators in the industry initiated this change; a third (32%) stated that that forces outside the industry were responsible; and a quarter (24.5%) acknowledged that leaders in the industry were the chief initiators. A high percentage of

the long-lived small firms (83%) stated that they generally were successful in implementing new technologies.

Table 7.9: ANOVA of Industrial Technical Change and I.T.

Information Technology	Industry Technical Change	N	Mean	Df_1	Df_2	F statistic	Sig.
Count of I.T.	NO	11	5.545				
	YES	52	7.519	1	61	7.941	0.007
Uses of I.T.	NO	11	3.364				
	YES	51	4.784	1	61	3.521	0.065

Note:
The p-value<0.05 (0.1) implying that the null hypothesis of equivalence in the means of the measures was rejected at a significance level of 5%(10%).

7.3.3 Conclusions

The scope of the administrative organisation of the firm evolved over the life of the firm. Extensions to the value chain occurred mainly in the support functions such as market research, strategic planning etc. The scope of the administrative organisation was found to be dependent on its scope at start-up. There was evidence of cohort effects, as older firms had a smaller administrative scope than younger firms. Employee growth was positively correlated with the extent of the administrative organisation but not with the long run performance indicator.

It seems that actual use of information technologies is important for the growth of the long-lived small firm over its life, as opposed to the count of the number of forms of information technology adopted by the firm. The level of technical change in the industry, perceived importance of information technology and the age of the firm seem to explain the number of forms of I.T. adopted and used by the firm. A firm with a broader administrative organisations scope also seems to have greater requirements and uses for information technologies, because their reporting systems are more formalised.

7.4 Organisational Change

Throughout its life, the mature small firm makes key organisational changes or 'critical decisions'. In essence, key organisational changes are to be construed as 'pivotal points' or 'crossroads', rather than as crisis points (see Section 2.3). Typically, they are strategic in nature, and are disengaged from the regular decisions undertaken by the mature small firm on a daily basis. Examples include; changes in ownership, legal form, technology, location, cashflow, innovation, line of business, investment, number of outlets, market niches, product range, market positioning, diversification, assets, capacity, inputs and management. This Section explores the frequency of occurrence of these changes, the nature of the changes, and their timing over the organisational lifecycle.

7.4.1 Key Organisational Changes

Accentuating the pivotal nature of key changes, it is observed that they occur, on average, just eight times over the lifetime of the long-lived small firm. The minimum and maximum number of changes was just two and sixteen respectively. Thus, owner-managers were clearly being very discerning in interpreting any change in their operations as being a key change. There is little evidence of a significant relationship between the age of the firm and the number of key organisational changes it has undertaken in its life (Pearson's R=0.014, p-value 0.457>0.05). The relative frequencies of key organisational changes over the life of the firm are presented in Table 7.10.

Almost three–quarters (71.4%) of the long-lived small firms interviewed experienced a change in their capacity. This was the most common form of organisational change faced by the small firm. Over half of the small firms changed their product range (70%), cashflow (67%), assets (59%), location (54%) and management (50.8%). Further, Table 7.10 presents the proportion of the organisational changes undertaken, which were identified by owner-managers as one of the three most salient changes infringing on the operations of the firm. This presents new information about the strategic importance of these changes. For example, of the forty percent of mature small firms, which experienced a change in ownership, two-thirds (68%) of the owner-mangers stated that this change was one of the three most important changes in the operations of their firm. A similar percentage (41.3%) experienced a change in their market niche but only fifteen percent

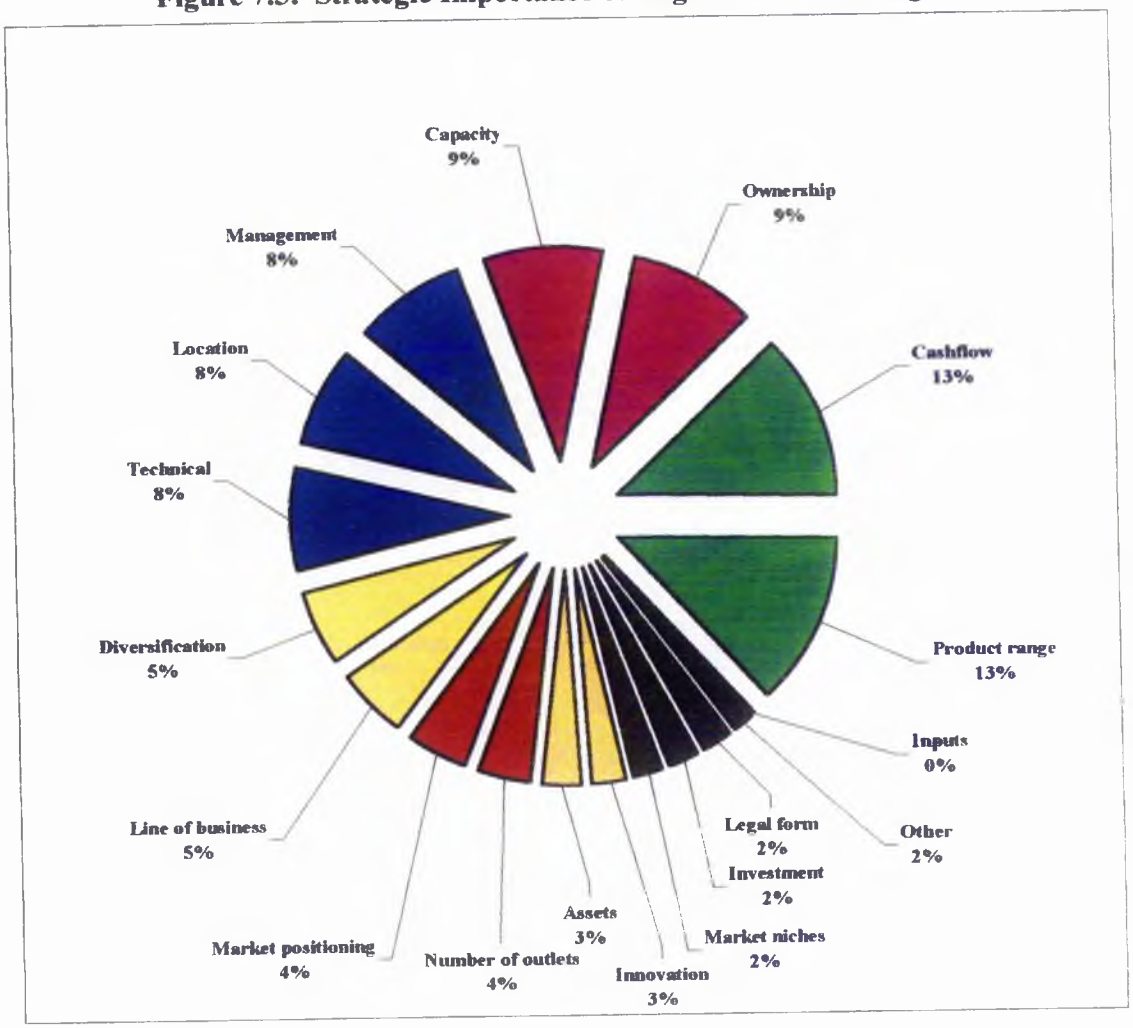
Table 7.10: Frequency of Occurrence of Key Organisational Changes

Type of Change			Importance of Organisational Change		
			1st	2nd	3rd
	N (%)	n (n/N)	n_1 (n_1/N_1 *100)	n_2 (n_2/N_2*100)	n_3 (n_3/N_3*100)
Ownership	25	17	11	5	1
	(39.7%)	(0.68)	(17.5)	(7.9)	(1.8)
Legal form	18	4	2	1	1
	(28.6%)	(0.22)	(3.2)	(1.6)	(1.8)
Technical	31	14	4	2	8
	(49.2%)	(0.45)	(6.3)	(3.2)	(14)
Location	34	14	4	6	4
	(54%)	(0.41)	(6.3)	(9.5)	(7)
Cashflow	42	23	10	9	4
	(66.7%)	(0.54)	(15.9)	(14.3)	(7)
Innovation	27	5	2	1	2
	(42.9%)	(0.19)	(3.2)	(1.6)	(3.5)
Line of business	23	10	3	4	3
	(36.5%)	(0.43)	(4.8)	(6.3)	(5.3)
Investment	29	4	2	1	1
	(46%)	(0.08)	(3.2)	(1.6)	(1.8)
Number of outlets	16	7		3	4
	(25.4%)	(0.43)		(4.8)	(7)
Market niches	26	4	1	3	
	(41.3%)	(0.15)	(1.6)	(4.8)	
Product range	44	24	9	10	5
	(69.8%)	(0.54)	(14.3)	(15.9)	(8.8)
Market positioning	26	8	2	3	3
	(41.3%)	(0.31)	(3.2)	(4.8)	(5.3)
Diversification	27	10	3	3	4
	(42.9%)	(0.37)	(4.8)	(4.8)	(7)
Assets	37	5	1	4	3
	(58.7%)	(0.14)	(1.6)	(6.3)	(5.3)
Capacity	45	16	5	7	4
	(71.4%)	(0.36)	(7.9)	(11.1)	(7)
Inputs	11	0			
	(17.5%)	(0)			
Management	32	15	2	1	12
	(50.8%)	(0.47)	(3.2)	(1.6)	(21)
Other	3	3	2		1
	(4.7%)	(1)	(3.2)		(1.8)
Total (N_T)		183	63	63	57
		(1)	(100)	(100)	(100)

believed that this change was one of the top three most important changes in the operations of their firm. It is therefore important to also examine the strategic importance of key organisational changes for the operations of the firm.

Figure 7.5 presents a pie graph illustrating the strategic importance of the key organisational changes. Of the 183 (or N_T) organisational changes ranked as top three main changes, changes in product range and cash flow were ranked as important in an eighth of the cases (13% or n/N_T), supporting the findings of Smallbone *et al.* (1992, 1995). Next in importance (at 9%) were changes in capacity and ownership. This was followed by changes in management, location and technology and so on. Little importance was attached to changes in inputs. The ordering of importance is in line with expectations. Organisational changes, which have been shown to influence the survival and growth of the firm, are ranked highly more often by mature small firms and visa versa (see Smallbone *et al.*, 1992, 1995).

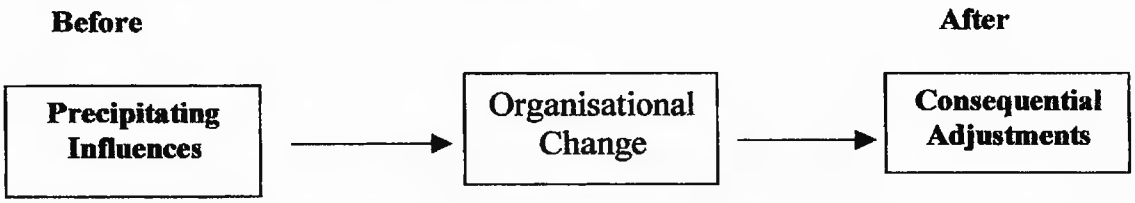
Figure 7.5: Strategic Importance of Organisational Changes



7.4.2 Features of Organisational Change

A simple diagrammatic device (see Figure 7.6 reproduced from Figure 4.1) was used in interviews with owner-managers to analyse the features of organisational change, namely 'precipitating influences' and 'consequential adjustments'. The term 'precipitating influences' was used to describe the forces, which led to organisational change. In a similar manner, the term 'consequential adjustments' was used to describe those adaptations, which 'followed-on' from organisational change. This diagrammatic device was helpful as it made explicit the pattern of causal relationships.

Figure 7.6: Explanation of Causation



As explained in Section 4.3.3, owner-managers could identify precipitating causes (arising from its environment), and consequential adjustments (arising from its own organisational change) on a show-card, which contained a comprehensive list of 30 potential categories (see Table 4.9). A count of the number of precipitating influences (P) and a count of the number of consequential adjustments (A) provides some insight as to effect of key changes on the operations of the firm. In a technical sense, the number of precipitating influences was measured by $P = \sum p_{jm}$ where p_{jm} is the occurrence of precipitating factor j for each change m. The number of consequential adjustments was measured by $A=\sum a_{jm}$ where a_{jm} is the occurrence of adjustment j for each change m. For each organisational change, the average number of precipitating causes (P/n) and consequential adjustments (A/n) were calculated, where n is the number of firms which undertook that change. The average level of precipitating causes ranges from two, in the case of innovation to seven, for changes in the line of business of the firm. The average level of consequential adjustments ranges from five, for changes in cash flow to ten, for changes in the line of business (see Table 7.11). The average number of precipitating

causes of organisational change (*Precipitators*) and the average number of consequential adjustments (*Adjust*) following organisational change across the three most important strategic changes identified by each firm, measured by $\sum_{c=1}^{3} P_c / \sum_{c=1}^{3} m_c$ and $\sum_{c=1}^{3} A_c / \sum_{c=1}^{3} m_c$ respectively, was 5.27 and 7.31 respectively. In general, the average number of precipitating causes (P/n) and consequential adjustments (A/n) for each organisational change are clustered around these aggregate levels (see Table 7.11).

Using real options logic, the greater the array of factors encompassed in the variable *Precipitator,* the higher the option value of the firm (see McGrath, 1999, proposition I). According to McGrath (1999), the owner-manager who seeks high revenue opportunities over a wider area of factors is more likely to discover them than one who focuses on a circumscribed area. Organisational changes embracing a relatively high count of precipitating influences are likely to have more volatile returns (e.g. changes in line of business, diversification). There is greater risk and uncertainty associated with these changes. Organisational changes comprising of a relatively high count of consequential adjustments (e.g. changes in line of business, location) represent those which involve greater levels of sunk costs or commitment (Ghemawat, 1991). Further, there seems to be a tendency for organisational changes which involve a high count of precipitators to involve a large number of consequential adjustments. A test of the null hypothesis that average number of precipitators of organisational changes and average number of consequential adjustments are negatively related, was rejected (Pearson's R of 0.495, p-value of

Table 7.11: Mean Precipitating Causes and Consequential Adjustments and Mean Precipitating Time and Adjustment Time by key Organisational Change

Type of Change	n	Precipitating Influences	Consequential Adjustments	Precipitating Time	Adjustment Time
Ownership	17	4.24	7.29	15.56	10.89
		(2.56)	(4.37)	(12.58)	(12.77)
Legal form	4	6	6.25	4.8	15.35
		(6.06)	(4.79)	(1.17)	(10.36)
Technical	14	6.5	7.93	10.38	5.63
		(3.55)	(4.08)	(15.71)	(7.83)
Location	14	4.5	8.69	13.12	2.56
		(2.65)	(3.33)	(15.59)	(3.42)
Cashflow	23	4.87	5.09	15.46	7.86
		(2.38)	(2.81)	(21.37)	(8.36)
Innovation	5	2	6	26	11.33
		(1)	(5.24)	(21.82)	(7.13)
Line of business	10	6.9	10.4	11.19	8.93
		(2.38)	(3.53)	(13.03)	(8.03)
Investment	4	5.5	6.75	18.25	13.84
		(3.11)	(3.30)	(12.82)	(22.33)
Number of outlets	7	6	9	18.86	3.08
		(1.91)	(4)	(8.78)	(3.98)
Market niches	4	5.75	7.25	7.97	25.48
		(3.59)	(3.86)	(10.70)	(27.19)
Product range	24	5.78	7.58	14.51	4.67
		(3.06)	(3.3)	(20.69)	(6.19)
Market positioning	8	5.75	7.25	4	4.77
		(3.65)	(5.09)	(4.54)	(5.32)
Diversification	10	6.6	7.6	19.9	3.94
		(4.48)	(5.56)	(35.65)	(4.91)
Assets	5	3.8	6.6	8.52	4.01
		(1.64)	(3.36)	(8.03)	(2.86)
Capacity	16	5.06	8.31	19.7	5.69
		(3.34)	(2.9)	(22.84)	(10.66)
Inputs	0	-	-	-	-
Management	15	5.29	7.27	15.42	5.52
		(3.67)	(5.27)	(18.08)	(7.21)

Note: Standard deviations are provided in parentheses

0.026 in one-tail). They represent strategic options, where the owner-manager waited until he had more information before acting to mitigate downside risks. It is difficult to make any further tentative suggestions regarding nature of organisational changes prior to

examining the quantitative evidence presented in Chapter 8 and the qualitative evidence presented in Volume II, Appendix 5.

7.4.3 Timing of Key Organisational Change

For each of the three main organisational changes identified by the owner-manager, the length of time from the emergence of precipitating factors to the organisational change (*PrecipitatorTime*) and the length of time from the organisational change to changes in adjustment factors (*AdjustTime*) was recorded. In stable markets, the shorter these time periods are, the more flexible is the long-lived small firm. This differs in uncertain environments. Using real options logic, small firms operating in these environments can also achieve greater flexibility by staging commitments to organisational changes (McGrath, 1999; Bowman and Hurry, 1993). Such a strategy minimises downside risks. The average adjustment time is longer in these cases as the owner-manager adopts a 'wait and see' policy (Miller and Folta, 2002; Ingersoll and Ross, 1992; McDonald and Seigel, 1986).

The average precipitating time per precipitator, is the sum of the number of months between detecting each precipitating factor (or 'driver') and making the organisational change, divided by the number of precipitating factors. Average precipitating time per precipitator P_t is calculated as $\sum pt_{jm}/\sum p_{jm}$ where pt_{jm} is the length of time between each precipitating factor j and the occurrence of each main organisational change m. The average adjustment time per consequential adjustment, is the sum of the number of months between making the organisational change and each consequential adjustment, divided by the number of adjustment factors. Average adjustment time per consequential adjustment A_t is calculated by $\sum at_{jm}/\sum a_{jm}$ where at_{jm} is the length of time between the occurrence of each main change m and each adjustment j. The average level of precipitating time per precipitator ranges from four months, for changes in legal form, to 26 months for innovation. The average level of adjustment time per consequential adjustment ranges from 2.5 months, for changes in location, to twenty-five months for entry into new market niches (see Table 7.11). The average precipitating time and the average adjustment time across the three most important strategic changes, calibrated by $\sum_{c=1}^{m} P_{tc} / \sum_{c=1}^{3} m_c$ and

$\sum_{c=1}^{m} A_{ic} / \sum_{c=1}^{3} m_c$ respectively, were 15 and 7 months respectively. As the average precipitating time per precipitator is much higher than the average adjustment time per consequential adjustment, this suggests that small firms lingered until they were certain that change was required and then responded quickly (given that the average number of precipitators was lower than the average number of adjustments). However, no apparent relationship was found between the mean precipitating time per precipitator and the mean adjustment time per consequential adjustment (Pearson's R of -0.197, p-value =0.465).

7.4.5 Conclusions

Smallbone, North & Leigh (1992, 1995) found that firms which had been active in making adjustments were the most successful in terms of growth in real turnover, employment and survival, using data collected on mature manufacturing firms. The flexibility of the long-lived small firm in adjusting to key changes in its environment, and the relationship between flexibility and performance is discussed further in Chapter 8. The evidence above found that these changes are indeed pivotal and occurred just eight times on average over the life of the firm. Some were ranked higher in importance than others (e.g. changes in product range and cashflow). There is some preliminary evidence here that firms adopt real options logic in undertaking key organisational change (see section 2.4.2). There is tentative evidence that owner-managers hold real options until uncertainties are resolved, especially when a change involves a number of consequential adjustments (i.e. when the downside risks are high). This observation suggests that the owner-manager scans the environment for more precipitators of change in this instance. At this juncture, there is little support for firms staggering adjustments to organisational change. However, Chapter 8 examines the empirical relevance of real options analysis further.

7.5 End-Games

For entrepreneurs who start a new firm, sooner or later, there comes a time when they choose, or are required by circumstances, to retire. This decision gives rise to a succession problem. This predicament can be solved in a number of ways: a family member could take over the running of the business; the owner-manager could sell the firm;

employees could take over the running of the business; or the owner-manager could close down the firm and sell or dispose of the assets of the firm. Each of these end-games, or harvesting strategies, as referred to by Tajnikar and Došenovič (2003), have different consequences for the continued operation of the mature small firm. Bjuggren and Sund (2002) argue that the decisive factor in choice of succession mode is the desire for efficiency, expressed as the highest possible value of the firm. A firm should stay in the family if this is the most profitable transition alternative. One reason for inter-generational succession, which they cite, is knowledge idiosyncrasy (i.e. trade secrets transferred through family members).

7.5.1 Family Succession

A fifth (21.7%) of the owner-managers believed that a family member would continue to run the business on their retirement. Long-lived small firms, which aimed to pass their businesses on to family members, were significantly higher performers (mean rating of 73 versus 67) according to the subjective performance measure (T test for two unrelated samples= 2.522, 61 d.f. at a p-value=0.03). Family succession, however, is no longer a foregone conclusion, for reasons indicated in Sub-section 5.2.2. Thus, the generational effect may have some impact on the lifecycle behaviour of the mature small firm. Small family firms face a higher risk of sudden exit after their thirtieth year (or one generation) (see Lotti and Santarelli, 2002; Lansberg, 1983; Beckhard and Dyer, 1983). According to Beckhard and Dyer (1983), only 30% of family firms in the U.S. are transferred to the second generation. In the U.K., a mere 24% are transferred to the second generation and 14% to the third.

Founders (principals) generally prefer to hand over the reins of their business to a family member rather than a professional manager, because the interests of the principal and his/her offspring (agent) are more likely to be aligned (Vickers, 1985). The resulting agent appointment game is more likely to be incentive compatible for the principal when he chooses an agent of his own type; namely a member of his family (who, as a natural result of family ties, can be understood to have an incentive structure the same type as his own). According to Kimhi (1997), intergenerational succession in family businesses involves a number of decisions: choosing a successor; timing the transfer of management

responsibilities; timing the transfer of ownership; income distribution before and after transfer; and the compensation of other heirs. Optimal succession time was chosen as a solution to a family utility maximisation problem. A tightening of borrowing constraints enforces early succession.

Enterprise profile A in Volume II Appendix 5, provides an example of a family run business founded in 1960 and transferred from the founder to his sons on his retirement in 1974. The two sons worked in the business while their father still managed it for up to ten years (i.e. the apprenticeship period). Family idiosyncratic knowledge was acquired through learning by watching and doing (see Dyer and Handler, 1994; Bjuggren and Sund, 2002). Thus, the founder was assured that his own interest and those of his sons were aligned on transfer of ownership. The founder was also aware of the level of competence of his two sons to run the business at the end of the period of apprenticeship. As these brothers are now approaching retirement, they also envisage that a family member will take over the running of the business. This illustration shows the importance of family succession in fostering the longevity of mature small firms.

Enterprise Profile B, the hospital supplies distributor, demonstrates an important lesson on the importance of assessing the business acumen of a family member wishing to take over the business. After a trial period with their daughter as manager, the husband and wife team who founded the firm, learned that their daughter did not have the personality for 'clinching sales deals' which was a vital skill in ensuring the continued success of the firm. They are currently examining other possible end-games.

The process of transition within the family needs to be managed sensitively as latent family issues tend to surface (e.g. sibling rivalries, management style differences, roles of in-laws, financial position of family members etc.) (Beckhard and Dyer, 1983; Dyck *et al.*, 2002). Every year approximately 300,000 jobs are lost and 30,000 enterprises close down in the European community as a result of badly managed family successions (see Bjuggren and Sund, 2002). According to Morris *et al.* (1997), family business successions occur more smoothly when heirs are better prepared, when family relations are affable and based on trust, and when family businesses engage in more planning for taxation and wealth transfer purposes.

7.5.2 Trade-sale

Four-fifths of the long-lived small firms in the sample believed that family succession was an unlikely outcome. Half (51.7%) of the mature small firms believed that a trade-sale would be a likely outcome but a far from certain one. The uncertainty surrounding this end-game is discussed below. Particularly, the hidden strategic implications involved are mapped out.

In general, the rivals of the mature small firm would prefer the business to close down. In this case, they can capture the customers of the firm, without incurring any cost. However, such an outcome would require co-operative behaviour on the part of rivals and a lack of interest by outsiders or employees in purchasing the firm as a going concern. When rivals are unable to co-operate in this manner, they may start a bidding war to purchase the firm. If all rivals bid for the business, the trade-sale price will rise and the winner could end up paying far too much for the business. Non-cooperation among rivals is a preferable outcome for the founder or seller of the business.

A rival may also be willing to purchase the business to prevent entry by an outsider (or employee). However, the attractiveness of a proposition to purchase an existing business by an outsider is low. At present, there are little incentives (start-up grants etc.) for an outsider to purchase an existing business in comparison with setting up a new competing firm [see Johnson, (2003) for a discussion on how policy measures which favour new businesses over existing businesses may displace existing businesses]. This is perhaps an area, which should be examined by industrial policy-makers (see case profile E). The closure of a viable long-lived small firm, in this instance, represents a form of market failure.

As there is a high risk that an owner-manager may receive few offers for his business, he has a lower incentive to continue to grow on the business towards the end of its life. A relatively low asset base will raise the relative number of outsiders who are willing to purchase the firm. Further, asymmetric information between the buyer and the seller about the performance of the business and its growth potential will also lower its trade-sale price and the incentive of the owner-manager to continue to expand the business (Ackerlof, 1980). Thus, the risk of adverse selection (purchasing a poor performer) lowers

the trade-sale price, the quality of the businesses for sale and the size of market for these businesses.[7] To obtain a fair price for the firm its owner-manager will have to try and signal the quality of his business prior to sale.

There are also moral hazard issues arising from customers switching when a small business changes hands. A number of customers may use this as an opportunity to 'shop around'. The loyalty of a customer to the firm may be tied to the reputation of the founder, not that of the new owner. In these instances, the founder is a significant part of the intangible assets of the business, e.g. service firms like mechanics, hairdressers etc. At the extreme, the firm has no re-sale value other than the disposable value of its tangible asset base.

7.5.3 Employee or Management Buy-Out

Owner-managers prefer an employee to take over the running of a business rather than outsiders if a family member is not interested or capable (see case profile B). There seems to be a 'pecking order' of preference in this instance also. A fifth (20%) of the mature small firms expected that an employee would take over the running of the business. Owner-managers of small firms did report difficulties in finding suitable candidates with an adequate level of competence, access to finance and a willingness to bear the risk of taking over the running of the business. Formal theories of entrepreneurial choice propose that the relative prices or rewards to employment, unemployment or self-employment as well as human capital, finance, attitudes to risk, family specific capital, receipt of inheritance govern moves from one employment state to another (see Knight, 1921; Lucas, 1978; Kihlstrom and Laffont, 1979; Holmes and Schmitz, 1990; van Praag and van Ophem, 1995; Blanchflower and Oswald, 1998; Dunn and Holtz-Eakin, 2000; van Praag and Cramer, 2001). There is a risk prior to retirement of the owner-manager that such an entrepreneurial employee would set up in competition with the firm rather than waiting to take over the running of his employer's business. In this instance, the employee may have access to some grant support.

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[7] Average assets at trade-sale were £339,045stg (higher than the average level in 2001). Assets of firms, which changed ownership, grew by 94% (155%) since the time of the trade-sale (corresponding standard deviation in parentheses).

The management of case profile D partly purchased the business from the founder in 1992. Even though the founder has retired, he is still involved in the running of the business in an advisory capacity, as he remains a chief equity holder in the business. The directors, who currently operate the business, were employed by the business for a number of years prior to taking over the day-to-day control of it (i.e. apprenticeship period). One of these directors signed an employment contract with the expressed intention of partaking in the running and ownership of the business. Incentives, such as the latter, attract entrepreneurial skills to join the firm. The founder (and now shareholder) still monitors the running of the business to ensure that his interests and those of the directors are aligned.

7.5.4 Close Down and Asset Disposal

A tenth (11.1%) of the mature small firms believed that the firm would close down on the retirement of the owner-manager. The owner-manager would try to recover the re-sale value of the assets, which had alternative uses, such as the premises of the firm. Often the premises represent the pension or 'nest egg' of the owner-manager. Owner-managers argued that this was their only resort. A low trade-sale price was expected, as a significant asset base of the business was intangible, viz. the skill of the owner-manager. Again in this case, if the firm valued the physical assets of the business too high, there would be a smaller number of buyers with the ability and the desire to purchase the assets of the firm.

7.5.5 Conclusions

The discussion above indicates the complexity of the decisions facing the owner-manager regarding his retirement from the firm and following this, the continued operation of the firm. The probability of exit of long-lived small firms is high, as family succession is no longer a foregone conclusion. The difficulty in finding a buyer, who is willing to pay a fair price for the business, raises the probability of exit. Further research is required to identify ways in which industrial policy makers could support the purchase of long-lived small firms by outsiders or employees. Aid in this area could perhaps reduce the death rates of long-lived small firms.

7.6 General Conclusions

In short, this Chapter presents new empirical evidence on factors influencing the longevity, growth and performance of mature small firms in Scotland. To survive in the long run, it seems that small firms learn to serve customers in the middle to top ends of the market. Very few firms survive by solely serving customers in the low end of the market. The evidence suggests that small firms face difficulties competing in this segment. Small firms are not on a level pegging with larger rivals who can achieve economies of scale in this segment of the market. Instead, it appears that small firms cultivate niche markets (e.g. through customisation or serving more premium ends of the market). As mature small firms become more differentiated, they tend to widen the dimensions of their competitive strategy space (e.g. price, quality, delivery etc.). The size of the competitive strategy space is related to the long run indicator of performance. The joint determination of size, performance and the competitive strategy of the firm are examined in a simultaneous system in Chapter 9.

A high proportion of long-lived small firms engaged in some form of product and process innovation. Older firms were inclined to engage in more process innovation than younger firms. Over their life they have perhaps become more aware of potential sources of efficiencies. Increases in wealth, approximated by asset growth, were related to the extent of product and process innovation. Process innovation was correlated with employment growth, suggesting that innovators tend marginally to greater internal control but neither product or process innovation was related to sales growth. This suggests that innovative activity has only a transitory effect on the sales of the mature small firm. Small firms lack proprietary control over near-to-market innovations and by implication, they constantly need to re-invent product offerings to survive in the long run.

The scope of the administrative organisation of the firm evolved over the life of the firm. Extensions to the value chain occurred in the support functions (e.g. market research, strategic planning etc.). These changes occurred as the firm grew in size (see Chapter 9 for more evidence on this relationship). Employee growth was positively correlated with the extent of the administrative organisation but not performance.

Further, it seems that actual use of information technologies is important for the growth of the long-lived small firm, as opposed to the count of the number of forms of technologies adopted by the firm. There is tentative evidence that mature small firms with a broader administrative organisational scope have greater requirements and uses for information technologies. Their reporting systems are perhaps more formalised.

Throughout their lives, long-lived small firms adapted to their environment to survive and grow, given their initial stock of resources and business acumen. Key organisational changes are pivotal in nature and occur on average just eight times over the life of the long-lived small firm. Of the range of pivotal organisational changes identified by owner-managers, changes in product range and cash flow were ranked as most important. Next in importance were changes in capacity and ownership, followed by changes in management, location and technology etc. There was a further tendency for organisational changes, which embraced a high number of precipitating events (i.e. signalling greater volatility) to involve a large number of consequential adjustments (i.e. commitments). This examination of the strategic importance, nature and timing of key organisational changes is followed-up in Chapter 8 with an examination of the flexibility of the firm in response to key organisational change and the consequences of flexibility for performance.

Inter-generational effects are particularly pertinent for the continued survival of these small firms as they approach their thirtieth birthday. Without a competent and willing family member, employee or potential buyer for the business, the small-unincorporated firm faces a high risk of sudden exit at this time. This, in turn, has consequences for the employees and wider community in which the firm operates. Indeed, owner-managers grow more concerned about this, as the firm grows older. The expectations of the owner-managers change, from a desire to create a business with survival prospects, to the consideration of more pecuniary motives (i.e. nest egg on retiring). Factors which hamper efficient transfer of ownership of firms include: the valuation of the enterprise; the financing of the transfer of ownership; the pool of buyers; legal dispositions; and both personal and emotional aspects. The European Commission has policies on family succession (article 10). However, as 10% of poorly managed family transitions end in

bankruptcy in the European Union, support (and/or education) for transfer of firms within the family and to other potential buyers, needs to be provided by industrial policy makers (see Bjuggren and Sund, 2002). An objective means of valuing these small firms should also be studied. The management of the process of transfer of ownership should also be supported (i.e. legal process and transfer of knowledge/skills etc.). This could perhaps reduce the death rates of long-lived small firms.

This comprehensive description of the typical long-lived small firm provides a reference point for understanding the results of the econometric analysis discussed, in Chapters 8 and 9. In Volume II, seven enterprise case profiles are presented, which illustrate using detailed qualitative evidence, the findings in this Chapter and in Chapters 8 and 9.

CHAPTER 8 FIRM-SPECIFIC TURBULENCE, FLEXIBILITY AND SMALL FIRM PERFORMANCE

8.1 Introduction

This Chapter focuses on the relationship between firm flexibility and the long run prospects of the small firm. It is argued that small firms survive and prosper, alongside larger firms, because of their relative flexibility in coping with environmental uncertainty (see Brock and Evans, 1989; Piore and Sabel, 1984; Acs *et al.*, 1990). To illustrate, small firms have a lesser need to employ hierarchy to control their operations, and offer greater opportunities for the utilisation of variable factors of production e.g. casualisation of labour to enhance performance (Reid, 1998, 1999). Further, the use of flexible production technologies by small firms favours product differentiation strategies and enables them to react quickly to changes in customers needs (Acs *et al.*, 1990).

The main hypothesis examines whether flexibility in undertaking key organisational changes (e.g. ownership, technology, location, line of business etc.) enhances the long run prospects of the small firm. This is explored through an analysis of the level and timing of precipitating causes of key organisational change identified by the owner-manager, and of the level and timing of consequential adjustments following the organisational change (see subsection 7.4.2). There is a lack of empirical evidence in the study of entrepreneurship on the relationship between firm flexibility and the long run prospects of the small firm (see Carlsson, 1989). This Chapter rectifies this deficiency by specifically considering this hypothesis using primary source data. This area of research reflects a change in economic policy, away from an emphasis on *volume* of start-ups to an emphasis on the *quality* of start-ups. The former has been the focus of the entrepreneurship literature in recent years (Birch, 1987; Davis *et al.*, 1996; and Barnes and Haskel, 2002).

Performance of the long-lived small firm is explained in terms of turbulence and flexibility. New measures of turbulence and flexibility are introduced. The latter reflect the agility and speed of long-lived small firms in responding to change. The former, is referred to as firm-specific turbulence, and represents the level of firm-specific organisational change over the life of the long-lived small firm. Performance was measured using the long run performance indicator (see subsection 6.3). The theoretical development of flexibility in the economics literature is considered in Section 2.4. Carlsson (1989) identified three important aspects of flexibility in his empirical

observations of larger firms. These were operational, tactical and strategic flexibility. The approach adopted here differs from Carlsson's (1989) in two respects: first, it focuses on small firms, rather than large firms; and second, it focuses on the aspect that he found most difficult to calibrate, strategic (long-term) flexibility. The latter refers to *"how the firm positions itself for the future"* (p.187) to cope with uncertainty. Similar to Carlsson's (1989) view, is Ghemawat's (1991) concept of flexibility. He defines flexibility in terms of the expected added value generated through the ability of the firm to revise its strategy, by adopting alternative courses of action, as the outcomes of uncertain events unfold. Both these definitions were influential in the formulation of the measures of small firm flexibility.

It was seen in Section 2.4.2, that real options theory explains how the value of a project, or new investment, can be augmented by valuing flexibility in the entrepreneurial decision-making process (Bowman and Hurry, 1993; Luehrman, 1997; McGrath, 1997, 1999). A sound valuation of a business opportunity captures its contingent nature (see Donaldson, 1994). For example, if market research indicates that sufficient demand exists for a new product, the entrepreneur will invest in its production, otherwise production of the new product may be either abandoned, or delayed. Both the direct (e.g. infrastructure requirements like increases in headcount, capacity etc.) and delayed effects (i.e. regulatory changes, network externalities, risk of pre-emption, loss of market share etc.) of such organisational changes must be considered in strategic decision-making (see Miller and Folta, 2002; Folta and Miller, 2002; Arthur, 1994; Ingersoll and Ross, 1992; Lieberman and Montgomery, 1988; McDonald and Seigel, 1986). This is especially important under conditions of high uncertainty and risk, when the ability to exploit future options is likely to be very important for a firm, but uncertainty exists as to which options will be 'winners' in the future (Dixit and Pindyck, 1994). Indeed, the whole idea behind investing in ways that create real options is to avoid over committing to a particular course of action, before this uncertainty is reduced (McGrath, 1999). Viewing the staging of resource commitments to organisational change as a series of sequentially exercised options accommodates environmental uncertainty (Bowman & Hurry, 1993). This permits project redirection, advances learning and allows investment to be discontinued at the earliest possible time,

while simultaneously conserving the firm's precious resources. By adopting a real options line of reasoning, the entrepreneur can raise the flexibility of the small firm, and thereby enhance the long run prospects of the small firm. In the interpreting the evidence presented in this Chapter, the empirical relevance of this approach is examined.

Early descriptive evidence on the relationship between flexibility and performance was provided by Smallbone *et. al* (1992, 1995). They found that firms which were active in making adjustments, were the most successful, in terms of growth in real turnover, employment and survival, using data from mature manufacturing firms in the UK. However, they did not examine the form, process, or speed of adjustment, nor did they quantify the performance implications of such adjustments. This work should remedy these shortcomings.

This Chapter proceeds as follows: Section 8.2 examines the calibration of measures of flexibility (e.g. *Agility, Speed*), and firm-specific turbulence. Then, in Section 8.3, econometric estimates are reported on the relationship between flexibility, firm-specific turbulence and performance. This is done in two forms. The first, involves generalised least squares estimation (with heteroskedastic adjustment) of the relationship between firm-specific turbulence, measures of flexibility and performance. The second, involves a Heckman sample selection estimation of this performance relationship. Based on the results of these estimations, the Heckman two-step procedure was re-estimated, decomposing the measures of agility and speed into their component parts (e.g. *Precipitator, PrecipitatorTime, Adjust* and *AdjustTime*). This was found to aid the interpretation of the results. A further estimation of the model controlled for learning and the different life histories of the mature small firms (e.g. inclusion of *Age* and Age^2 as explanatory variables), and nonlinearities in the relationship between firm-specific turbulence and performance. Tentative evidence of nonlinearities between the components of speed (e.g. *PrecipitatorTime, AdjustTime*) and agility (e.g. *Precipitator, Adjust*) were identified in the latter two specifications of the model. Section 8.4 tests for these nonlinearities by including interaction terms between the measures of agility and speed in the Heckman two-step estimation of the performance relationship. Section 8.5 concludes this Chapter.

8.2 Measurement of Firm-Specific Turbulence, Flexibility and Performance

This Section presents information on the variables used in econometric estimation and provides some amplification of the key hypotheses to be addressed. Initially, a detailed explanation is provided of how the key variables are defined and calibrated. Summary statistics for each of the key variables are discussed and are presented in Table 8.1 below.

8.2.1 Firm-Specific Turbulence

In this study, turbulence is measured in a novel way, and is referred to as 'firm-specific turbulence' (*or FSTurbulence*). This new approach follows the case study evidence of Markusen and Teitz (1985), which measures turbulence at the firm level. In their work, which concerned the underlying dynamics of the competitive environment, they found that the markets in which mature small firms operated were turbulent. All firms in their sample were expecting some change, whether in the form of a crisis, or growth opportunity. With respect to large corporations, Reilly *et al.* (1993) similarly defined turbulence as organisational changes experienced by the firm that were "*nontrivial, rapid and discontinuous...such as rapid growth, merger and hostile takeover.*" (p.167). Insights from the literature on stages of growth models and contingency theory were also influential in devising this measure of firm-specific turbulence (see Subsection 2.3), as this literature emphasises organisational change at the firm level.

By contrast, the approach of Beesley and Hamilton (1984) is industry specific, rather than firm-specific, where turbulence is approximated by accounting for flows in the birth and death of firms in particular industries. A high number of relative flows in the birth and death of firms in an industry signals a high level of turbulence in that industry. Fluctuations in patterns of demand across product varieties or plant locations, displacement of existing technologies by alternatives, regulatory restrictions, and the displacement of existing products by new and superior substitutes, are potential drivers of this industry specific form of turbulence (see Geroski, 1991, Chp 3; Dunne and Roberts, 1991; Sutton, 1997; Confraria, 1998; Segarra and Callejón, 2002). Certainly, evidence across different industries suggests a positive correlation between gross entry and exit rates (see Sutton, 1997; Caves, 1998).

Table 8.1: Mean, Standard Deviation and Range of Each Variable

Variable	Mean	Standard Deviation	Min	Max
FSTurbulence	7.90	3.8	2	16
Agility	0.874	0.407	0.220	2.38
Speed	21.84	16.19	2.45	73.9
Precipitators	5.27	2.72	1	15.67
Adjust	7.31	3.33	1.67	16
PrecipitatorTime	15.98	13.53	0	56
AdjustTime	16.65	16.44	0	70
Perform	67.35	8.10	49.11	90.43

Here, firm-specific turbulence (*FSTurbulence*) is measured by a frequency count of the number of changes undertaken by the mature small firm, *qua* organisation, over its lifetime. In a technical sense, *FSTurbulence* was calculated as $\sum X_i$, where X_i is the occurrence of a change *i*. According to this measure, a relatively high number of organisational changes signals that the mature small firm is operating in a turbulent environment. Emphasising the pivotal nature of key changes, it was observed in Subsection 7.4.1 that they occur, on average, just eight times over the lifetime of the long-lived small firm (see Table 8.1). Thus, the average level of *FSTurbulence* was eight. The range was fourteen and the maximum *FSTurbulence* score was just sixteen. An *FSTurbulence* score of 5 or less (the lower quartile) was received by firms experiencing low levels of firm-specific turbulence, whereas a score of 9 or more (the upper quartile) was received by firms experiencing a lot of firm-specific turbulence.

It might be expected that older firms in the sample experienced higher levels of *FSTurbulence,* merely because they were older. However, a test of the null hypothesis that Pearson's correlation coefficient, calculated for the count of key organisational changes and age, equalled zero could not be rejected (see Subsection 7.4.1). Thus, *FSTurbulence* is not age related. Furthermore a test of the null hypothesis of equivalence in the mean level of *FSTurbulence* across manufacturing and services firms in the sample (independent sample T test statistic= 1.117, d.f.=61, p-value=0.268) and across legal forms (ANOVA $F_{(2\ ,\ 61)}$ statistic=0.680, p-value=0.511) could not be rejected. Whereas there is little evidence of

differences in mean *FSTurbulence* across broad sectoral classifications, legal forms, and age, firm-specific turbulence was found to be significantly positively correlated with firm size and growth, as measured by FTEs and turnover respectively (see Table 8.2). Thus, larger and fast growing firms experience higher levels of firm-specific turbulence, confirming Smallbone's *et al.* (1992, 1995) findings.

Table 8.2: Significant Correlates between Firm-Specific Turbulence and Firm Size

Variable	Pearson's Correlation with *FSTurbulence*	
Turnover growth (lifetime)	Pearson Correlation	0.288
	Sig. (2-tailed)	0.058
	N	44
FTE growth (lifetime)	Pearson Correlation	0.356
	Sig. (2-tailed)	0.007
	N	56
FTEs 2001	Pearson Correlation	0.405
	Sig. (2-tailed)	0.001
	N	63
Turnover 2001	Pearson Correlation	0.289
	Sig. (2-tailed)	0.022
	N	63

8.2.2 Measures of Flexibility

Carlson's (1989) notion of strategic flexibility and Ghemawat's (1991) conception of flexibility are not concerned with the optimisation of strategy, but rather the selection of strategies that can be adapted to a range of critical outcomes. The ability to revise the small firm's strategy, as circumstances unfold, enables the small firm to survive long-side large firms, which have scale advantages. This view of flexibility was influential in devising the dimensions of flexibility, referred to as *agility* and *speed.*

8.2.2.1 Agility

Small firm flexibility arises from their intense use of variable factors of production (e.g. casualisation of labour, lack of hierarchy, flexible production technologies etc.) (see Reid, 1998, 1999; Mata, 1993; Acs *et al.*, 1990; Brock and Evans, 1989). The ability to adapt these factors of production, in response to forces of environmental change, reflects the first dimension of flexibility, referred to as 'Agility'. The greater is the Agility of the small firm, the more easily can the entrepreneur exercise strategic options when they have

reached fruition. Thus, the agile small firm is prepared for organisational change. In response to drivers of environmental change, it can react with relatively fewer adjustments.

Agility is calibrated by a ratio of the number of precipitating influences of organisational change (P) to the number of consequential adjustments (A) following organisational change. *Agility* was calculated for each of the three most important changes, m, and averaged across these three changes (i.e. divided by $\sum_{c=1}^{3} m_c$).[1] Formally *Agility* is calculated as

$$\frac{\sum_{c=1}^{m} (P_c / A_c)}{\sum_{c=1}^{3} m_c} \qquad (8.1)$$

where $P = \sum p_{jm}$ and p_{jm} is the occurrence of precipitating factor j for each change m. $A=\sum a_{jm}$, where a_{jm} is the occurrence of adjustment j for each change m. A larger relative score for *Agility* implies that a firm is relatively more agile, and thus more flexible (i.e. the small firm adjusts less for a given number of precipitating influences). On average, the long-lived small firm's agility score is 0.87. As this value is less than 1, it implies that the typical long-lived small firm finds it difficult to limit the amount of trimming (or consequential adjustments) they need to make as a consequence of organisational change.[2]

As well as acting on precipitating influences, the small firm needs to be able to detect that circumstances have changed per se. To illustrate, Mata (1993) has found that uncovering precipitating influences can be a source of flexibility in small firms, and this ability differs across owner-managers. He found that if owner-managers within the small firms' sector were not alert to detecting environmental changes, the presence of small firms

[1] Each firm described the precipitators and consequential adjustments for the three most important changes, which occurred over their life (see Section 4.3.3). Note only two firms in the sample had less than three main organisational changes.

[2] The average number of precipitators (*Precipitator*) and the average number of adjustments (*Adjust*) are calculated by the ratios $\sum_{c=1}^{3} P_c / \sum_{c=1}^{3} m_c$ and $\sum_{c=1}^{3} A_c / \sum_{c=1}^{3} m_c$ respectively. It was seen in Section 7.4.2, that the average number of precipitating influences (*Precipitator*) is 5.27, which is lower than the average number of consequential adjustments (*Adjust*) at 7.31.

would not grow. Alertness to precipitating causes of organisational change in the environment, and greater agility in making consequential adjustments following strategic change, is important to the long run prospects of the long-lived small firm.

8.2.2.2 Speed

Speed measures the ability of the small firm to respond promptly in the face of both precipitating influences (arising within its environment), and consequential adjustments (arising from its own organisational change). Thus, the speedy small firm acts quickly before and after internal organisational change. Timeliness in reacting to precipitating causes of organisational change in the environment and in implementing consequential adjustments following change can provide a small firm with an early mover advantage, through creating switching costs, network externalities, buyer inertia and scale economies etc. (see Mueller, 1997). However, when small firms are operating in environments which are subject to high risk and uncertainty, adopting a '*wait and see*' strategy, scanning the environment to detect precipitating influences of organisational change, before exercising a strategic option, is perhaps wise (see Bowman and Hurry, 1993). Further, in such environments, staging commitments (or consequential adjustments) to organisational change is a prudent strategy, as it minimises downside risk and provides the small firm with the option to withdraw at low cost (see Subsection 2.4.2).

Formally, the speed of adjustment (*Speed*) can be computed by summing precipitating time (*PrecipitatorTime)* and consequential adjustment time (*AdjustTime)*. Recall, the length of time lapsed from the emergence of precipitating factors to the organisational change is *PrecipitatorTime*; the length of time lapsed from the organisational change to changes in adjustment factors is *AdjustTime* (see Subsection 7.4.2). *Speed* is calculated here as

$$\frac{\sum_{c=1}^{3}(P_t + A_t)_c}{\sum_{c=1}^{3} m_c} \qquad (8.2)$$

where *PrecipitatorTime*, P_t, was calibrated as the length of time lapsed between the identification of the first precipitator by the owner-manager and the exercise of the organisational change [i.e. the maximum the length of time lapsed between each precipitating factor j and the occurrence of main organisational change m, pt_{jm}, or $Max(pt_{jm})=P_t$]. *AdjustTime*, A_t, was approximated by the length of time lapsed between the exercise of the organisational change and the final consequential adjustment factor [i.e. the maximum length of time between the occurrence of main change m and each consequential adjustment j, at_{jm}, or $Max(at_{jm})=A_t$]. In a similar vein, these measures were initially calculated for each of the three most important organisational changes. Then, average measures across the three most important changes were computed. The shorter are these time periods (i.e. average *PrecipitatorTime*, average *AdjustTime*, average *Speed)*, the quicker the long-lived small firm acts in response to forces of environmental change. On average, *PrecipitatorTime* is marginally less than *AdjustTime* with values of 16 and 17 months, respectively. *Speed* was, on average, 22 months.

The measures of average *PrecipitatorTime* and average *AdjustTime* adopted above, differ from those discussed in Subsection 7.4.2 and in Power and Reid (2002) for two reasons. The measures of average *PrecipitatorTime* and average *AdjustTime* described in Subsection 7.4.2 cannot be adopted in econometric estimation, since they are linear functions of the number of precipitators (*Precipitators or P*) and the number of adjustments (*Adjust*s or A). Estimates of the performance relationship would be inefficient due to multicollinearity between the regressors. The measures of *AdjustTime* and *PrecipitatorTime* adopted in Power and Reid (2002), while overcoming the latter, fail to account for the clustering of precipitators of organisational change and consequential adjustments[3]. The clustering of precipitators and consequential adjustments drive these approximations of average *AdjustTime* and average *PrecipitatorTime* upwards. For example, let us examine *PrecipitatorTime* for two firms A and B[4]. Let us assume that firm

[3] The approximations of *PrecipitatorTime* and *AdjustTime* adopted by Power and Reid (2002) were calculated as follows

$$\sum_{m=1}^{3} pt_{jm} \Big/ \sum_{c=1}^{3} m_c \text{ and } \sum_{m=1}^{3} at_{jm} \Big/ \sum_{c=1}^{3} m_c .$$

[4] A similar example could be presented for *AdjustTime*.

A identified four precipitators 6 months before changing its operations and firm B identified one precipitator at 18 months, and another one at 6 months, before changing its operations. Both firms A and B would receive a *PrecipitatorTime* score of 24 months, using Power and Reid's (2002) approximation. However, firms A and B would receive a *PrecipitatorTime* value of 6 months and 18 months respectively, using the definition of P_t expressed above in equation (8.2). Using Power and Reid's (2002) approximation of *PrecipitatorTime*, Firm A's speed measure is biased upwards considerably, from a response time of 6 months to 24 months. An implicit account is taken in Power and Reid's (2002) approximation of the number of precipitators. Thus, it is more likely that an interaction between *Precipitator* and *PrecipitatorTime* would be found. Power and Reid (2002) do not explicitly test for interactions between the regressors, but as Section 8.4 examines this source of variation in the performance relationship, the conservative measures of P_t and A_t, expressed in equation (8.2) are adopted.

8.2.2.3 Correlates with Measures of Flexibility

Table 8.3 presents Pearson's correlation coefficients between the measures of flexibility and firm-specific turbulence. *Agility* and *Speed* are weakly negatively correlated (Pearson's R=-0.23), with only a five percent probability in one tail that this result could have occurred by chance. Thus, more agile firms are likely to react faster to changes in their environment. The average number of consequential adjustments (*Adjust*) is significantly positively correlated with the average number of precipitators (*Precipitator*) (Pearson's R=0.661). This provides tentative evidence that organisational changes, that require a large amount of adjustments, prompt the owner-manager to adopt a '*wait and see*' strategy, scanning the environment for more precipitators of change. The average number of consequential adjustments (*Adjust*) is also positively correlated with average consequential adjustment time (*AdjustTime*) (Pearson's R=0.24, p-value=0.057). This indicates that adjustments are staggered for organisational changes which involve a large number of adjustments (i.e. more time has elapsed before the instigation of incremental adjustments).

Table 8.3: Significant Correlates between Measures of Firm-Specific Turbulence and Flexibility

		Speed	AdjustTime	Precipitator Time	Agility	Precipitator	Adjust
AdjustTime	Pearson Correlation	0.853					
	Sig. (2-tailed)	*1.06E-17*					
PrecipitatorTime	Pearson Correlation	0.775	0.330				
	Sig. (2-tailed)	*3.11E-16*	*0.008*				
Agility	Pearson Correlation	-0.229	-0.164	-0.215			
	Sig. (2-tailed)	*0.071*	*0.199*	*0.091*			
Precipitator	Pearson Correlation	0.036	0.079	-0.031	0.301		
	Sig. (2-tailed)	*0.780*	*0.538*	*0.809*	*0.017*		
Adjust	Pearson Correlation	0.267	0.240	0.192	-0.382	0.661	
	Sig. (2-tailed)	*0.034*	*0.057*	*0.133*	*0.002*	*2.87E-09*	
FSTurbulence	Pearson Correlation	0.146	0.176	0.051	-0.119	0.451	0.452
	Sig. (2-tailed)	*0.255*	*0.168*	*0.694*	*0.354*	*2.0 E-5*	*2.0 E-05*

PrecipitatorTime and *AdjustTime* are significantly positively related (Pearson's R=0.33). However, this finding may seem to be counter-intuitive. An expectation exists that, if the firm adopted a *'wait and see'* policy to resolve uncertainties prior to implementing organisational change (i.e. lengthening precipitator time), that the firm would then have to adjust quickly (i.e. a shorter adjustment time) to capture any performance improvements (i.e. a speedy firm is more flexible, and therefore achieves higher performance). The apparently counter-intuitive result may be explained by viewing consequential adjustments as a sequential chain of strategic options. In this instance, each option exercised provides preferential access to the next option in the chain. However, further options in the chain are not exercised unless they have matured and the value of waiting is at its lowest. Staggering consequential adjustments to organisational changes in this manner, may lengthen the adjustment time, and thereby generate a positive relationship between precipitator time and adjustment time. By proceeding in this way, the entrepreneur can raise the performance of the firm. Such tactics build on good fortune and mitigate against bad fortune (see Folta and Miller, 2002; McGrath, 1999; Luehrman 1998; Bowman and Hurry, 1993).

Firm-specific turbulence (*FSTurbulence*) is significantly positively correlated with the average count of precipitators (*Precipitator*) and with the average count of

consequential adjustments (*Adjust*). This suggests that firms which experience greater firm-specific turbulence, are perhaps better at scanning the environment for precipitators of change, but also need to make more organisational adjustments, following key organisational changes. This indicates that these firms have to engage in more trimming because they are not as agile. Certainly, the relationship between *Agility* and *FSTurbulence* is weakly negative confirming this, however it is insignificant and thus cannot be relied upon (Pearson's R=-0.119).

Measures of flexibility were not correlated with age, nor did they differ across legal forms, or broad sectoral classifications. Few measures of flexibility were related to size, lending general support for Carlsson's (1989) theory, that there are some aspects of flexibility which are not related to size. The average number of precipitators was significantly positively related to fulltime equivalent employee growth (Pearson's R=0.273), implying that firms which grew in headcount had a greater capacity to identify more precipitators of change. There was less than a five percent probability, in a one tailed test, that this result could have occurred by chance.

8.2.3 Subjective Measure of Long Run Performance

The long run indicator of performance *Perform* was described in Subsection 6.3. A performance score for each small firm was obtained by summating ratings on 28 items covering aspects of the firm's business strategy (9 items), financial management (4 items), internal organisation (4 items) and environment (11 items). This subjective measure is more consistent with our evidence base. It was shown in Section 6.4 to behave in a similar manner to conventional financial data, but was not subject to the misgivings of the latter, which make such measures difficult to interpret in sensible economic terms. On average, mature small firms in the sample received a performance score of 67 (out of a potential score of 0-100). A larger score indicates higher performance.

8.2.4 Performance, Flexibility and Firm-Specific Turbulence

This Subsection concludes by examining the expected causal relationship between flexibility and firm-specific turbulence (as independent variables) and performance (as the dependent variable). In general, greater flexibility is expected to have a positive effect on performance. This is true of approaches to flexibility, as diverse as those of Stigler (1939),

Ghemawat (1991) and Aiginger and Weiss (1998). Firm flexibility has also been shown to explain relatively greater small firm presence in uncertain environments (see Mills and Schumann, 1985). This increased presence is indicative of enhanced small firm performance and prospects of survival. Furthermore, in real options logic, the greater the uncertainty, the more valuable is a real option. As the downside of a real option is fixed, the chance of gain is greater under high uncertainty, but the risk of loss no larger. Thus, the flexibility that a real option offers is valuable under these conditions (Brealey and Myers, 1986; Fama and Miller, 1972).

In general, the greater the number of consequential adjustments relative to the number of precipitating influences, the less agile is the small firm. Here, *Agility* is interpreted as one aspect of flexibility. A higher level of *Agility* is expected to improve the performance of the small firm. If *Speed* is measured by the time taken to respond to both precipitating influences and consequential adjustments, it is expected to influence performance negatively.

As compared to the unambiguous effect of flexibility, the effect of firm-specific turbulence on performance is less clear. In general, a higher number of organisational changes would reflect a greater degree of firm-specific turbulence and visa versa; however, it does not automatically imply improved performance. Reid and Smith (2000b) found that both poorly performing ('stagnant') firms and highly performing ('adaptive') firms have relatively active discretionary policies. Whereas stagnant firms frequently embrace organisational change to counteract the consequences of inflexibility in terms of poor performance, adaptive firms frequently embrace organisational change to facilitate greater growth and other aspects of improved performance.

8.3 Estimates

To examine the degree to which the different dimensions of flexibility, and firm-specific turbulence, affect the performance of the long-lived small firm, Heckman's sample selection model is applied (Lee, 1982, 1983; Heckman, 1976, 1979; Davidson and MacKinnon, 1993). This model assumes that there exists an underlying relationship between the long run performance score (*Perform),* the measure of firm-specific turbulence

(*FSTurbulence)* and the measures of flexibility (e.g. *Agility* and *Speed*) of the long-lived small firm. This can be expressed as follows:

$$Perform = \beta_0 + \beta_1 FSTurbulence + \beta_2 Agility + \beta_3 Speed + u_{1i} \quad (8.3)$$

where $u_1 \sim N(0, \sigma)$. It is expected that sample selection bias exists as the measures of performance, firm-specific turbulence, and flexibility are only observed for long-lived small firms, but not for non-survivors.[5] Initially, a probit model of the survival of long-lived small firms is estimated using maximum likelihood estimation. This model can be written as:

$$S = X\beta + u_{2i} \quad (8.4)$$

where S is a binary variable which is equal to unity if the firm has survived, but otherwise equal to zero. The matrix X contains observations on those factors thought to influence the long-run survival of firms (e.g. number of full-time and part-time employees, gearing and number of product groups), the vector β contains the estimated parameter coefficients and $u_2 \sim N(0, 1)$. The correlation between u_1 and u_2 is given by ρ.[6] From the binary probit estimation, the inverse of Mill's ratio is calculated (lambda or λ). The inverse of Mill's ratio is used as an additional regresssor in the generalised least squares estimation of the performance equation (8.3) above. Heckman's (1976, 1979) two-step procedure provides consistent estimators, under certain regularity conditions.[7]

Initially, the performance relationship (8.3) was estimated on a sample of 186 firms, for which complete data exists for the 63 long-lived small firms, as well as the 123 non-surviving firms. Parsimonious data on industrial sector (*Sector*), start year (*StYear*), sales

[5] If firm survival was random the fact that performance, firm-specific turbulence and flexibility is not observed for non-survivors could be ignored. However, the random survival of small firms is unlikely to be true, as significance differences exist between survivors and non-survivors in their performance, financial position etc. (see Reid, 1991, 1999; Audretsch, 1991; Mata and Portugal, 1994, 2002; Wagner, 1994; Mata *et al.* 1995; Doms *et al.* 1995; Audretsch and Mahmood, 1995; Cressy, 1996; Louri and Fotoloupos, 2000a). Thus, the observed measure of performance of the sample of survivors is perhaps biased upwards.

[6] ρ ranges from -1 to $+1$. Within this range ($\rho \neq 0$) standard regression techniques applied to the performance equation will not yield consistent results. If ρ is not significantly different from zero ($\rho = 0$), selectivity is not a problem for the data set.

[7] If selectivity bias exists ($\rho \neq 0$), while Heckman's (1976, 1979) two-step procedure produces consistent estimators, they are not efficient estimators.

in the early years of trading *(StSales)*, full-time employees (*FtEmployees*) and part-time employees (*PtEmployees*) was available for the non-surviving and the long-lived small firms, and is used to estimate the selection relationship (8.4) (see Table 8.4 for definitions of the variables). These variables were available for all three-parent samples. Heckman's (1979) two-step procedure was also used for re-estimation on a sample of 89 firms (consisting of 39 long-lived small firms and 50 non-surviving firms), for which two additional regressors were available for inclusion in the sample selection equation: the gearing ratio *(Gearing);* and the number of product groups (*ProdGroup*). These additional variables were only available for two parent samples. The procedure was conducted twice in an attempt to use the available data in a comprehensive fashion.

Initially, for comparative purposes, generalised least squares estimators were computed of performance relationship (8.3) without sample selection. From a preliminary, exploratory, ordinary least squares regression of the performance relationship (8.3), a plot of the residuals against the predicted values suggested that the residuals were increasing with values of the predictors. To correct for this, the ordinary least squares model was weighted by the reciprocal of *Sales,* as a linear proportional relationship of the reciprocal of *Sales* to the absolute value of the residuals was found to be significant using the Glejser test for heteroskedasticity, see Davidson and McKinnon, (1993), ch. 11. The generalised least squares model presented in Table 8.5 had an R^2 of 0.99 with probability value of 0.000.[8] The results of Heckman's two-step procedure are presented in Tables 8.6 and 8.7. It is these estimates that are discussed in detail below, rather those of the generalised least squares estimation, taking a precautionary stance, as they have been corrected for

[8] The interpretation of the R^2 is dubious when there is no constant term in the least squares model, as in this case, where the ordinary least squares model is transformed by 1/sales (see Greene, 2000, p.467).

Table 8.4 Definition of variables used in main text

Variable	Definition
Age	Age of firm, in years.
Agility	Agility is the ratio of precipitator to adjustment factors averaged over three main changes.
Adjust	Count of adjustments averaged over three main changes = $\sum a_{jm}/3$, where a_{jm} is the occurrence of adjustment j for each main change m.
AdjustTime	Length of time between change m and the implementation of the last adjustment = Max $(at_{jm})/\sum_{c=1}^{3} m_c$, where a_{jm} is the occurrence of adjustment j for each main change m.
Employees	Number of full-time equivalent employees in 2001.
FtEmployee	Number of full-time employees at start-up.
FSTurbulence	Count of main changes over life of long-lived small firm = $\sum X_{i,}$, where X_i is the occurrence of a change i.
Gearing	=bank loan/personal injection.
Perform	= $\sum f_i/n$, where f_i is the self appraised score between 0-100 for each factor averaged overall factors 1 to n which were applicable.
Precipitator	Count of precipitator factors averaged over the three main changes = $\sum p_{jm}/3$, where p_{jm} is the occurrence of precipitator factor j for each main change m.
PrecipitatorTime	Length of time between the first precipitator and change m = Max $(pt_{jm})/\sum_{c=1}^{3} m_c$, where pt_{jm} is the length of time between each precipitator factor j and the occurrence of each main change m.
ProdGroup	Number of product groups.
PtEmployee	Number of part-time employees at start-up.
Sales	Sales in 2001.
Sector	=0 services (SIC 61-99), 1 =manufacturing (SIC 01-60).
Speed	The overall speed of adjustment can be obtained by summing the average precipitator time and the average adjustment time .
StSales	Sales at first interview (1985 for SBE, 1991 for telephone, 1994 for Leverhulme) at 2001 prices.
StYear	Year the business was established.
Survival	=1 survivor, 0 otherwise

selectivity bias. However, it is observed that the results presented in Tables 8.6 and 8.7 are broadly similar to the results in Table 8.5. The correlation between the disturbances in the performance and selection equations, ρ, is close to zero, suggesting that selectivity bias is not a major problem. In fact, a likelihood ratio test of the null hypothesis, $\rho=0$, could not be rejected for the Heckman estimations presented in Tables 8.6 and 8.7, confirming that

selectivity bias is not a key concern. Therefore, what is true of our analysis in Tables 8.6 and 8.7 is also true of our analysis in Table 8.5.

8.3.1 Sample Selection Equations

The sample selection equations are interpreted initially, even though the central hypothesis of this Chapter focuses on the results of the performance equation. The main burden of the rest of this Chapter will explain the relationship between firm-specific turbulence, flexibility and performance. Firstly, the sample selection equation in Table 8.6 is examined, which was estimated with the larger sample size (N=186).

From Table 8.6, it is observed that the coefficient on sales early in the lifecycle of the small firm (*StSales*) was significant. That is, initial size conditions had a positive impact on long run survival. The effect of size had a quite high elasticity; a 1% increase in mean sales earlier in the lifecycle increases the probability of survival by 0.2%, using elasticities calculated at the mean[9]. This kind of influence one would expect to observe, in terms of fundamental modelling of the small firm's growth process. For example, if the time series of sales from inception is a random walk, terminating when this process hits the absorbing barrier of zero sales, the mean passage of time to exit is higher, the greater are first period sales. Furthermore, this finding confirms evidence of a positive relationship between initial size and firm survival for the U.S. (Evans, 1987a, b; Hall, 1987; Dunne *et al.* 1989a), Canada (Baldwin, 1995), the UK (Dunne and Hughes, 1994), Portugal (Mata and Portugal, 1994; Mata *et al.*, 1995) and Germany (Wagner, 1994), see Subsection 3.3.2.1.

[9] Elasticities are calculated in the form of $\delta \log y / \delta \log x$ which gives the percentage change in y for a 1 percent change in x.

Table 8.5 Generalised Least Squares of Equation (8.3) *(N=63)*

Regressors	Coeff.	Std. Error	Prob.	Elasticities at mean
FSTurbulence	-0.682	0.165	0.000	-0.100
Agility	8.600	3.141	0.000	0.099
Speed	0.383	0.033	0.008	0.164
Constant	55.023	3.024	0.000	0.837

Note: R^2 adjusted =0.994; $F_{(6, 57)}$= 2414.51 Prob.>F = 0.0000

Table 8.6: Heckman Sample Selection Model of Equation (8.3) *(N=186)*

Regressors	Coeff.	Std. error	Prob.	Elasticities at mean
FSTurbulence	-0.704	0.165	0.000	-0.104
Agility	8.700	3.039	0.000	0.101
Speed	0.386	0.033	0.004	0.166
Constant	55.334	2.982	0.000	0.848
Selection Equation				
Sector	-0.040	0.200	0.842	-0.071
FTEmployee	-0.004	0.012	0.766	-0.023
PTEmployee	-0.013	0.017	0.434	-0.043
StYear	-0.003	0.011	0.776	-0.277
StSales	4.94E-07	2.50E-07	0.048	0.199
Constant	-0.247	1.009	0.807	
Mills-lambda	-572900.2	1130278	0.612	
Rho	-0.073			
Sigma	7854975.5			
Wald chi2(6)	7424.31			
Prob>chi2	0.0000			

Note: Likelihood ratio test of Independent equations (Rho=0): Chi2(1)=0.30 Prob>Chi2=0.587

Table 8.7 Heckman Sample Selection Model of Equation (8.3) ***(N=89)***

Regressors	Coeff.	Std. error	Prob.	Elasticities at mean
FSTurbulence	-0.860	0.223	0.000	-0.129
Agility	6.984	3.937	0.000	0.082
Speed	0.420	0.041	0.076	0.183
Constant	58.102	4.001	0.000	0.900
Selection Equation				
Sector	0.239	0.326	0.463	0.387
FTEmployee	-0.002	0.021	0.914	-0.013
PTEmployee	-0.012	0.019	0.533	-0.035
StYear	-0.018	0.027	0.517	-1.412
StSales	7.35E-07	4.39E-07	0.094	0.271
Gearing	1.5E-04	5.3E-04	0.778	-0.018
ProdGroup	0.241	0.130	0.063	0.610
Constant	-0.073	2.361	0.975	
Mills-lambda	-2011447	2213760	0.364	
Rho	-0.210			
Sigma	9587812.3			
Wald chi2(6)	3890.92			
Prob>chi2	0.000			

Note: Likelihood ratio test of Independent equations (Rho=0): Chi2(1)=1.02 Prob>Chi2=0.313

Manufacturing firms had a negative influence on long run survival in Table 8.6 (N=186) but a positive influence in Table 8.7 (N=89). This effect is not significant in both instances. This conflicting result probably occurs because the sample of 89 firms has a greater representation of manufacturing firms [i.e. it contains firms from the Leverhulme (1985-1988) and Leverhulme (1994-1997) parent samples, the former which over samples

manufacturing firms, see Subsection 4.2.1.1]. While all manufacturing firms are subject to the pressures of de-industrialisation, this effect is proportionally less in a sample containing more manufacturing firms.

The number of full-time and part-time employees had a negative effect on survival. This suggests a larger headcount has a negative effect on long run survival, regardless of whether it is casual labour or fulltime employees *cf.* Reid (1999). Indeed, in Chapter 9 a trade-off was found to exist between firm size and performance implying that the mature small firm must become leaner and more efficient over time, if it is to survive. In addition, long-lived small firms are cautious about hiring new staff due to strict employment laws (see Blackburn and Hart, 2002, 2003; Edwards *et al.*, 2003). Growth in services firms with lower headcounts, and the decline in manufacturing, also explains this result (Storey, 1994:34-43). However, here the influences of both these variables do not have a significant impact on survival.

Age, generally, has a positive effect on survival (see Subsection 3.3.2.2). The year the firm was founded (*StYear*) was included in the estimation of the survival equation (8.4) as a proxy for the age of survivors and non-survivors, since data on the year in which the vast majority of non-survivors in our sample ceased to trade was not available. However, care needs to be taken, in interpreting this variable, as a result. *StYear* has a negative sign, which clearly juxtaposes the common effect of age on firm survival. However, from an inter-generational perspective, the impact of this variable suggests the longer the small independent firm is in business, the more likely it is going to exit the market. Thus, it suggests that if the owner-manager is retiring, and there is no market for the small business, or family member(s) willing and competent to take over the running of the business, the small firm is likely to cease trading (see Lotti and Santarelli, 2002; Bjuggren and Sund, 2002). Again, this effect is not significant.

Turning to the sample selection equation in Table 8.7, which contains two additional regressors, the gearing ratio (*Gearing*) and the number of product groups (ProdGroup), and where the sample size is smaller (N=89). It is observable that the number of product groups (*ProdGroup*) is significant at the 10% level. The elasticity is very high. A 1% increase in mean number of product groups supplied earlier in their lifecycle

increases the probability of long run survival by as much as 0.61%. This effect is consistent with the findings of Reid (1991). Furthermore, Ungern-Sternberg's (1990) work emphasises the importance of the diversification of the product portfolio to accommodate fluctuating demand for individual products.

In examining the survival of small firm start-ups, Reid (1991) found that gearing had a significant negative effect on small firm survival. This is consistent with Fotopoulus and Louri's (2000a) findings for Greek firms. A higher level of leverage was found to raise the firm's hazard rate (see Subsection 3.3.2.3). Here, gearing has a negative sign but it is not a significant predictor of long run survival. If equity finance is a cheaper source of finance capital, the optimal strategy for a highly geared small firm is to retire debt early in its lifecycle (see Reid, 2003). However, later in its lifecycle many forms of capital could be appropriate to the long-run survival of a specific firm.

8.3.2 Performance Equations

Performance is examined using three estimators. First, a generalised least squares estimator, without sample selection, using a sample size of N=63 (see Table 8.5). Second, a Heckman sample selection estimation, using a sample size of N=186 (see Table 8.6). Third, a Heckman sample selection estimation, using a sample size of N=89 (see Table 8.7). The focus of the discussion to follow is on the estimates presented in Tables 8.6 and 8.7, which corrects for sample selection. Estimates of the performance equation in Table 8.6 are chiefly discussed below, as there are few differences between the results of Tables 8.6 and 8.7. Where differences emerge, these are clearly mentioned in the text.

Turning first to firm-specific turbulence *(FSTurbulence),* it was found to have a negative impact on performance. A 1% increase in the mean count of organisational changes reduces performance by 0.10% (or by 0.13% in Table 8.7). Excessive organisational change seems to be to the detriment of the long-lived small firm's performance. As a business journalist commented on Power and Reid's (2002) findings, "many a meddle may make a muddle of the business", (see Jamieson, 2002). There is an intuitive explanation for this, which supports the interpretation of Reid and Smith (2000b) discussed above. It is that the relationship between firm-specific turbulence and firm performance tends to be U shaped. Both poorly performing firms (or 'stagnant' firms in

their terminology) and highly performing firms (or 'adaptive' firms in their terminology) tend to be relatively active in undertaking changes, compared to moderately performing firms. Thus, stagnant firms are active in making organisational changes to survive, whereas adaptive firms are active in making organisational changes to improve performance and promote growth. It may be that there is only a small proportion of 'adaptive firms' in the sample experiencing positive dynamics, and a much larger proportion of relatively 'stagnant' firms driving the negative relationship between *FSTurbulence* and *Perform*. This suggests that there is another selection process here, besides the long-run test of economic survival. It may take the form of deciding whether or not the small firm grows to be a large firm - a 'gazelle' as denoted by Birch (1996). Part of the reason for the existence of gazelles, may be that they are intrinsically designed to be of relatively large scale, and that they very rapidly grow towards this target size after inception. Many of the long-lived small firms have succeeded in the first selection process, but very few are triumphant in the second. Subsection 8.3.3 includes the square of *FSTurbulence*, as an additional explanatory variable in the performance relationship, to test whether the relationship between firm-specific turbulence and performance is in fact U-shaped.

Proceeding now to the flexibility measures in Table 8.6, it is noted that *Agility* has a significant and positive impact on performance. A 1% increase in the number of precipitators per adjustments (*Agility*) increases performance by 0.10% (or by 8% in Table 8.7). This implies that small firms, which need to make less consequential adjustments in response to precipitators of change, face greater long run prospects. Such firms have an internal organisational structure, which is better equipped to cope with environmental change (i.e. they use more flexible production technologies).

The coefficient on *Speed* also has a positive and significant impact on performance. According to Table 8.6, this variable has a larger impact than any other does on performance. Indeed, a 1% increase in the speed of the firm in responding to change increases performance by 0.17% (or by 18% in Table 8.7). A shorter reaction time would normally be expected to increase performance, rather than the reverse as in this case. This result may be explained by the existence of internal and external costs to undertaking consequential adjustments or using real options logic.

From the former perspective, small firms in the sample may be subject to short-term rigidities to growth such as financial constraints (i.e. lack of internal funding and difficulties raising finance externally), skill shortages, fixed capacity etc. (see Nilsen *et al.,* 2001; Doms and Dunne, 1998; Barber *et al.,* 1989). These rigidities may prevent the small firm from initiating a speedy response. However, such constraints would not normally enhance performance. The latter real options perspective, would argue that the small firm might sensibly decide to stage their adjustments in face of real uncertainties, regarding the future outlook of any organisational change. Adopting a '*wait and see*' approach minimises the small firm's loss in event of withdrawal, while at the same time providing it with the option to commit further resources, if uncertainties are resolved. Thus, by staging resource commitments to organisational changes in uncertain environments (i.e. implying a longer adjustment time), it is envisaged that the small firm could raise the firm's performance by avoiding downside risks. Ghemawat (1991) recommended staging the commitment of resources to a new strategy, thereby increasing the firm's flexibility to pull back if the organisational change is unsuccessful. Such a policy raises the firm's option value to withdraw or to invest depending on how circumstances unfold. It should be noted, that cautiousness in the commitment of resources to a strategy is not the only factor influencing this speed variable, but also the time it takes to react to precipitators of change. A small firm may also not exercise organisational change until certain that it will improve performance (McDonald and Siegel, 1986).

It seems that the regressors, *Agility* and *Speed,* in performance relationship (8.3) mask the effects of their individual component parts. By decomposing *Agility* into average count of precipitators of change (*Precipitator*) and average count of consequential adjustments (*Adjust*) and *Speed* into average precipitating time (*PrecipitatorTime*) and average adjustment time (*AdjustTime)* further knowledge is obtained on the relationship between the dimensions of small firm flexibility and performance. The specification of this new performance relationship is presented in equation (8.5) below and the results of the estimation of this relationship are discussed in Subsection 8.3.3.

8.3.3 Extended Performance Equation

To further analyse the complexity of the relationship between the measures of flexibility and performance, the specification of the performance relationship (8.3) is extended in two ways. First, the measures of agility and speed are decomposed into their components (e.g. *Adjust, AdjustTime*). Equation (8.3) is re-expressed as follows;

$$Perform = \beta_0 + \beta_1 FSTurbulence + \beta_2 Precipitator + \beta_3 Adjust + \beta_4 PrecipitatorTime + \beta_5 AdjustTime + u_{1i} \quad (8.5)$$

Second, three further regressors are added to equation (8.5) in equation (8.6). An additional regressor, *FSTurbulence* squared, is included in equation (8.6) to test whether the hypothesis that the relationship between firm specific turbulence and the long run prospects of the firm is U–shaped convex (positive second derivative) or concave (negative second derivative). The variable *Age* and the square of *Age* are also included to capture potential learning effects, and to control for the different life histories of the long-lived small firms (see Agarwal and Gort, 2004). Equation (8.5) is extended as follows:

$$Perform = \beta_0 + \beta_1 FSTurbulence + \beta_2 FSTurbulence^2 + \beta_3 Precipitator + \beta_4 Adjust + \beta_5 PrecipitatorTime + \beta_6 AdjustTime + \beta_7 Age + \beta_8 Age^2 + u_{1i} \quad (8.6)$$

Equations (8.5) and (8.6) were estimated using Heckman's two step estimation method for the larger sample size, (N=186). Only the results of the estimation of the performance relationships are presented in Table 8.8. The estimates of the sample selection equation (8.4) for N=186 are unchanged, and thus are not presented here (see Table 8.6). Associated elasticities at the mean, for performance relationship (8.5) and (8.6), are presented in Table 8.9. Both of the performance relationships are discussed in turn below.

Table 8.8: Heckman Sample Selection of Equations (8.5) and (8.6)*(N=186)*

Estimation	EQN (8.5)	EQN (8.6)
Regressors	**Coeff.** *(Std. Error)*	**Coeff.** *(Std. Error)*
FSTurbulence	-1.457*	-3.255*
	(0.162)	*(0.842)*
(FSTurbulence)^2		0.116*
		(0.042)
Precipitator	1.181*	0.469
	(0.288)	*(0.299)*
Adjust	0.119	0.585**
	(0.307)	*(0.294)*
PrecipitatorTime	-0.174***	-0.061
	(0.090)	*(0.080)*
AdjustTime	0.405*	0.296*
	(0.030)	*(0.035)*
Age		-0.553**
		(0.224)
(Age)^2		0.008**
		(0.003)
Constant	66.495*	79.647*
	(1.804)	*(3.190)*
Mills-lambda	618626.3	500299.8
	(915376.6)	*(813980.9)*
Rho	0.106	0.100
Sigma	5864461.2	5017532.2
Wald chi2	13421.77	18343.31
d.f.	6	9
Prob>chi2	0.000	0.000

Notes: *significant at p-value=0.01; ** significant at p-value=0.05; ***significant at p-value=0.1

Table 8.9: Elasticities at mean of Equations (8.5) and (8.6) *(N=186)*

Estimation	EQN (8.5)	EQN (8.6)
Regressors	**Elasticities at mean**	**Elasticities at mean**
FSTurbulence	-0.215	-0.480
(FSTurbulence)^2		0.200
Precipitator	0.096	0.038
Adjust	0.013	0.064
PrecipitatorTime	-0.029	-0.010
AdjustTime	0.107	0.078
Age		-0.194
(Age)^2		0.077
Constant	1.015	1.122

8.3.3.1 Interpretation of Estimates of Equation (8.5)

Turning first to the estimates of equation (8.5), firm-specific turbulence (*FSTurbulence*) still has a large negative impact on the long-run prospects of the small firm. In fact, this variable has a considerably higher elasticity (-0.21) than any other regressor in this specification of the model. The impact of this variable has doubled in comparison with the estimate of *FSTurbulence* in the aggregate model presented in Table 8.6. As found above, too much organisational change can negatively impact on performance.

According to the estimates of equation (8.5) in Table 8.8, it seems that an intricate relationship exists between the measures of flexibility (i.e. *Precipitator, Adjust, PrecipitatorTime* and *AdjustTime*) and performance (*Perform*). The number of precipitating influences, which the owner-manager can identify from scanning the environment, (*Precipitator*), had a highly significant and positive effect on the long run performance of the small firm. The size of the effect is large judged by its elasticity. A 1% increase in the mean count of precipitators (*Precipitator*) increases performance by 0.10%. The count of precipitators of organisational change reflects the alertness of the entrepreneur to changes in the small firm's environment (Smith, 1997a; Wickam, 2001 p.324). The capacity of the owner-manager to identify potential drivers of opportunities to improve performance is important (see Mata, 1993). That is, the owner-manager for whom the count variable *Precipitator* is high, is not just passively noting changes in the environment. Rather, he is actively seeking signs of environmental change to which the business could be better adapted. Using real options reasoning, the greater the array of factors embraced in the variable *Precipitator,* the higher the option value of the firm (see McGrath, 1999, proposition I).

The *PrecipitatorTime* variable in equation (8.5) had a weakly significant negative effect on performance, with a ten percent probability that this result could have occurred by chance. The elasticity is moderately large (-0.03%). This suggests that a longer response time to detected changes in its environment had a significant negative impact on the performance of the small firm (*PrecipitatorTime*). A swift response improves the performance of the small firm.

Interpreting the results for *Precipitator* and *PrecipitatorTime* jointly suggests that the influences of both these variables on performance differ (an may work in opposing ways). With a larger number of detected precipitators of organisational change, the firm has greater certainty that organisational change is necessary, to improve performance, or for sheer survival. However, if a small firm is slow to respond to detected drivers of change, it risks being too late to achieve improvements in performance from instigating the organisational change. A speedy response time improves performance. Therefore a trade-off seems to arise. The longer is the *PrecipitatorTime,* the more *Precipitators* are detected. The more *Precipitators* are detected, the more are uncertainties surrounding the organisational change being resolved. But the longer the *PrecipitatorTime,* the greater is the risk that the mature small firm will fail to capture some of the benefits of improved performance. The interpretations of the estimates of *Precipitator* and *PrecipitatorTime* in performance relationship (8.6) are also captured by the discussion above (i.e. the direction of the signs are the same, the magnitude of the elasticities fall slightly). However, the coefficients on *Precipitator* and *PrecipitatorTime* are not significant when the three additional regressors are included in the model.

Discussion now examines the influence of the level and timing of consequential adjustments which the mature small firm instigates, following an organisational change (e.g. changes in headcount, stock levels or credit policy). There are some differences in the behaviour of the variable, *Adjust,* between equations (8.5) and (8.6). The coefficient on *Adjust* is not significant in equation (8.5), but has a positive and significant effect on performance in equation (8.6), with a higher elasticity. A 1% increase in the mean count of adjustments (*Adjust*) increases performance by 0.06%. A higher number of consequential adjustments (*Adjust*) following an organisational change, other things being equal, increase the performance of the long-lived small firm. A higher number of absolute adjustments may signal greater commitment by the firm to the organisational change. Furthermore, greater commitment perhaps indicates that the organisational change has significant implications for the long run survival prospects of the firm, Ghemawat, (1991).

The variable *AjustTime*, the lag between the organisational change (instigated by some precipitating influences), and the last consequential adjustment (e.g. capacity,

cashflow), had a positive and a highly significant impact on performance. This effect is similar across equations (8.5) and (8.6) [The elasticity is slightly higher in equation (8.5) 0.1% versus 0.08% in equation (8.6)]. This result is surprising as the small firm, which is slow to adjust, perhaps due to difficulties in altering the factors of production (e.g. technology), achieves a higher level of performance. However, the interpretation offered by real options analysis is preferred here (see Bowman and Hurry, 1993; Luehrman, 1998; McGrath, 1999). A real options approach would hold that extending *AdjustTime* could attenuate potential downside risks by limiting fixed costs and irreversible investments until uncertainties are resolved. This raises the bundled value of the portfolio of options (or consequential adjustments) and the flexibility of the firm. However, the staging of consequential adjustments (i.e. extending *AdjustTime*) may imply that it takes longer to receive the payoffs from organisational change. Thus, increases in the option value, deriving from increased flexibility, may come at a cost. In a technical sense, a trade-off exists. McGrath and Nerkar (2004) argue along similar lines that the value of an option (i.e. or an incremental investment) if not exercised is subject to diminishing returns with the passage of time. Thus, the entrepreneur cannot postpone investment indefinitely without risking the erosion of the value of the option.

Interpreting the estimates for *Adjust* and *AdjustTime* jointly, it seems that the more adjustments (*Adjust*), the greater the sunk cost or the downside risk, in the event of withdrawal. However, a longer adjustment time (*AdjustTime*) can reduce the downside risks, as uncertainties are resolved. But the longer the *AdjustTime*, the longer it takes to receive the payoffs or the performance improvements following the organisational change (i.e. the small firm risks imitation by rivals, loss of market share etc.) (see Folta and Miller, 2002; Arthur, 1994; Lieberman & Montgomery, 1988). Thus, the extension of *AdjustTime* is not costless. The enterprise profiles presented in Volume II, Appendix 5 illustrate the dynamics of this argument for key organisational changes undertaken by a subset of firms in the sample.

8.3.3.2 Interpretation of Estimates of Equation (8.6)

When the square of firm-specific turbulence (*FSTurbulence*^{2}) was included as an additional regressor in the performance relationship (8.6), the effect of this variable was found to be positive and significant. The elasticity on squared firm-specific turbulence (*FSTurbulence*^{2}) is high at (0.2%). The size of the elasticity on *FSTurbulence* increased considerably in this specification of the performance relationship (i.e. from –0.22 to –0.48). In general, the findings suggest that the rate at which firm specific turbulence negatively impacts on performance declines as firm-specific turbulence increases. Performance is a convex function of firm-specific turbulence. As poorly performing firms (or 'stagnant' firms) and highly performing firms (or 'adaptive' firms) tend to be relatively more active in undertaking organisational change (see Reid and Smith, 2000b), the declining rate at which firm-specific turbulence negatively influences performance sheds some light on this relationship. Adaptive firms are perhaps actively engaging in organisational change to enhance the long-run prospects of the firm. By contrast, stagnant firms are actively engaging in organisational change to offset poor performance.

The coefficient on *Age,* and the square of *Age,* is significant in explaining the long run prospects of the mature small firm in equation (8.6). A convex U-shaped relationship is present, here also, between age and performance. Age has a negative effect on performance (high elasticity of -0.19). This effect is similar in nature to the inverse relation found between age and firm growth (see Evans 1987a, b; Liu *et. al.,* 1999; Reid, 1993; Dunne *et. al.* 1989a, Variyam and Kraybill, 1992; Dunne and Hughes, 1994) rather than the positive relationship found between age and firm survival (see Evans, 1987 a, b; Dunne *et al.* 1989a; Dunne and Hughes, 1994; Heshmati, 2001). It seems that the long run prospects, or performance, of the small firm declines as the firm gets older, however at a decreasing rate. The elasticity of the coefficient on the square of age is positive, but relatively low at 0.07. Performance is a convex function of age. This is a satisfactory result. If performance fell at an increasing rate, the long run survival of these mature small firms would be tenuous.

The interpretation of the estimated components of agility (i.e. *Adjust, Precipitator*) and speed (i.e. *PrecipitatorTime, AdjustTime*) in performance relationship (8.6) are

captured by the discussion above. However, the effects of age and firm-specific turbulence tend to explain most of the variation in the long run prospects of the small firm in this instance. A likelihood ratio test applied to a comparison of the specification of the model in equation (8.6) with that of equation (8.5) in Table 8.8 produced a χ^2 statistic of 19.31, which is considerably higher than the relevant $\chi^2_{0.05}$ (3) significance point of 7.81. By implication, the preferred specification is the extended model in equation (8.6)[10]. The complexity of the relationship between the components of agility and speed indicates that there are likely non-linearities between the measures of speed (*i.e. PrecipitatorTime, AdjustTime*) and agility (*i.e. Precipitator, Adjust*) in the model. Interactions terms are included in equations (8.5) and (8.6) below to examine whether variation in performance is explained by simultaneous variation in measures of speed and agility.

8.4 Interactions between Flexibility Measures in the Performance Equation

Non-linearities between firm-specific turbulence and performance and age and performance were discussed above. This Section extends the performance relationship further to test whether non-linearities exist between the components of agility (i.e. *Precipitator, Adjust*) and speed (*i.e. PrecipitatorTime, AdjustTime*). Interaction terms, to capture simultaneous variation in these variables, are included as additional independent variables in performance relationships (8.5) and (8.6). These performance relationships are rewritten here, incorporating the interaction terms, as equations (8.7) and (8.8) respectively.

$$Perform = \beta_0 + \beta_1 FSTurbulence + \beta_2 Precipitator + \beta_3 Adjust + \beta_4 PrecipitatorTime + \beta_5 AdjustTime + \beta_6 (Precipitator * PrecipitatorTime) + \beta_7 (Adjust * AdjustTime) + u_{1i} \quad (8.7)$$

$$Perform = \beta_0 + \beta_1 FSTurbulence + \beta_2 FSTurbulence^2 + \beta_3 Precipitator + \beta_4 Adjust + \beta_5 PrecipitatorTime + \beta_6 AdjustTime + \beta_7 (Precipitator * PrecipitatorTime) + \beta_8 (Adjust * AdjustTime) + \beta_9 Age + \beta_{10} Age^2 + u_{1i} \quad (8.8)$$

[10] If L_0 and L_1 are the log-likelihood values associated with the full and constrained models respectively. Then $\chi^2 = -2(L_1 - L_0)$ with $d_0 - d_1$ degrees of freedom, where d_0 and d_1 are the model degrees of freedom associated with the full and constrained models.

As above, equation (8.8) is an extension of equation (8.7), it includes the square of firm-specific turbulence, age and the square of age as additional regressors.

In these specifications of the performance relationship two sources of non-linearities are hypothesised to exist. The first, an interaction term tests for simultaneous variation between the count of precipitators (*Precipitators*) and precipitating time (*PrecipitatorTime*). Tentative evidence of a trade-off between the count of precipitators (*Precipitator*) and precipitating time (*PrecipitatorTime*) was found above. The second interaction term in equations (8.7) and (8.8) tests for simultaneous variation between the count of consequential adjustments (*Adjust*) and the length of time lapsed between the exercise of the organisational change and the instigation of the final consequential adjustment (*AdjustTime*). Preliminary evidence of a trade-off between *Adjust* and *AdjustTime* was also found above.

The performance relationship, specified in equations (8.7) and (8.8), formally investigates the influence of the variables *Precipitator, PrecipitatorTime, Adjust* and *AdjustTime,* when interaction terms between these regressors are controlled for in the Heckman sample selection two-step procedure. The results for performance relationships (8.7) and (8.8), corrected for sample selectivity, are presented in Table 8.10, for N=186. Related elasticities at the mean are presented in Table 8.11. Sources of non-linearities between the components of speed and agility in the performance relationships are discussed in turn below.[11]

8.4.1 Interpretation of estimates of Equation (8.7)

Examining the results of equation (8.7), it is observed that the interaction between the number of precipitators (*Precipitator*) and the time it takes for the firm to instigate change (*PrecipitatorTime*) is negative and significant. Simultaneous variation in the

[11] Similar observations to those presented above can be provided for non-linearities in firm-specific turbulence and age (i.e. both variables are convex in performance). They seem to be explaining most of the variation in performance in equation (8.8). A likelihood ratio test, applied to a comparison of model (8.8) with that of model (8.7) in Table 8.10, produced a χ^2 statistic of 11.41, which is higher than the relevant $\chi^2_{0.05}$ (3) significance point of 7.81. This suggests that the joint addition of *Age*, square of *Age* and *FSTurbulence* squared increased the explanatory power of the model as above. The preferred specification is the extended model in equation (8.8).

number of precipitators (*Precipitator*) and *PrecipitatorTime* attenuate their individual effects.

The influence of *Precipitator* on performance is positive and significant (elasticity =0.17).[12] Greater alertness to forces of environmental change, and as a consequence more real-time information, has a positive impact on performance. It aids in the resolution of uncertainties. However, there are diminishing returns to adopting a 'wait and see' strategy (e.g. preemption, late entry, missed opportunities etc.) in an effort to identify further precipitators. The marginal effect of a higher absolute number of precipitators (*Precipitator*) on performance is reduced; the longer it takes the firm to initiate organisational change (*PrecipitatorTime*). The size of the elasticity on the interaction term is not inconsiderable at -0.09. This suggests that on observing an increasing number of warning bells or negative infleunces in the environment (*Precipitator*), the entrepreneur must balance its needs for further information to resolve uncertainties, with a greater impetus to act quickly (i.e. shorter *PrecipitatorTime*) to raise performance. Thus, there seems to be evidence to support a real options approach to decision-making. At all times, the entrepreneur must weigh the costs and benefits of exercising a strategic option now, or in the future, given the available information (i.e. to exercise the real option its value cost metric>1, NPV >0 and its volatility should be low, see Luehrman, 1998 and Subsection 2.4.2).

In equation (8.7), the sign of *PrecipitatorTime* has altered, it is now positive and the coefficient on this variable is no longer significant. The positive sign of *PrecipitatorTime* here does not alter the interpretation. It implies that adopting a 'wait and see' strategy improves firm performance, which is in line with the logic of real options (see Miller and Folta, 2002; Ingersoll and Ross, 1992; McDonald and Seigel, 1986). However, the elasticity of 0.06 is lower than the -0.09, the elasticity of the interaction term. The effect of a longer *PrecipitatorTime* is reduced as the number of *Precipitators* of organisational change increases. As above, more warning bells demand a quick response time, otherwise

[12] In model (8.7), the marginal effect of a higher number of precipitators on performance is given by $\delta E(\text{Perform})/\delta \text{Percipitator} = \beta_2 + \beta_6 \text{PercipitatorTime}$
Similar expressions can be written for marginal effect of the other regressors in the model, which are captured by the interaction terms.

the potential risk of late entry, or the prospect that the opportunity is going 'out of the money' (or has passed), is high. Indeed, there are diminishing returns to the adoption of a 'wait and see' strategy.

The interaction between the number of adjustments (*Adjust*) and the time it takes for all adjustments to occur (*AdjustTime*) is negative, but it is not significant in equation (8.7). In any case giving it interpretation, the marginal effect of a higher absolute number of consequential adjustments (*Adjust*) on performance is reduced as the adjustment time (*AdjustTime*) increases, and the marginal effect of a longer adjustment period (*AdjustTime*) on performance is reduced as the number of adjustments increases (*Adjust*). There are diminishing marginal returns to increasing the number of consequential adjustments (*Adjust*) or increasing *AdjustTime* (i.e. staging consequential adjustments). A relatively smaller number of adjustments and a relatively shorter adjustment time are preferred to achieve performance improvements. However, the elasticity of this interaction term is only moderate at –0.01.

Table 8.10 Heckman Sample Selection of Equations (8.7) and (8.8) ***(N=186)***

Estimation	***EQN(8.7)***	***EQN(8.8)***
Regressors	**Coeff. (Std. Error)**	**Coeff. (Std. Error)**
FSTurbulence	-1.560*	-3.151*
	(0.168)	*(0.890)*
(FSTurbulence^2)		0.102**
		(0.045)
Precipitator	2.088*	1.311*
	(0.535)	*(0.539)*
Adjust	0.572	0.473
	(0.426)	*(0.392)*
PrecipitatorTime	0.198	0.194
	(0.177)	*(0.162)*
AdjustTime	0.407**	0.143
	(0.195)	*(0.195)*
Precipitator*PrecipitatorTime	-0.109*	-0.069***
	(0.038)	*(2.885)*
Adjust*AdjustTime	-0.007	0.016
	(0.022)	*(0.036)*
Age		-0.472**
		(0.225)
Age^2		0.007**
		(0.003)
Constant	61.980*	76.720*
	(2.317)	*(4.731)*
Mills - lambda	948046.4	13512
	(843857.3)	*(802524.9)*
Rho	0.176	0.125
Wald chi2	16102.09	19387.07
Df	6	11
Prob>chi2	0.0000	0.0000

Notes: *significant at p-value=0.01; ** significant at p-value=0.05; ***significant at p-value=0.1

Table 8.11 Elasticities at mean of Equations (8.7) and (8.8) ***(N=186)***

Estimation	***EQN(8.7)***	***EQN(8.8)***
Regressors	**Elasticities at mean**	**Elasticities at mean**
FSTurbulence	-0.230	-0.465
(FSTurbulence^2)		0.175
Precipitator	0.169	0.106
Adjust	0.063	0.052
PrecipitatorTime	0.033	0.032
AdjustTime	0.107	0.038
Precipitator* PrecipitatorTime	-0.094	-0.059
Adjust*AdjustTime	-0.014	0.035
Age		-0.166
Age^2		0.066
Constant	0.947	1.172

There is some support for arguments by Miller and Folta (2002) to extend adjustments to organisational change (i.e. compound options or multistage investments in their terminology), as *Adjust* and *AdjustTime* are positive in sign, with elasticities at the mean of 0.06 and 0.11 respectively. These elasticities are higher than the elasticity on this second interaction term, and thus the impact of the latter is small. However, once this second interaction term is included as a regressor in the performance model, the coefficient on the number of adjustments (*Adjust*) is no longer significant (even at the ten percent probability level), but adjustment time (*AdjustTime*) remains significant.

8.4.2 Interpretation of estimates of Equation (8.8)

The effect of the interaction term (*Precipitator*PrecipitatorTime*) is negative, and significant, in equations (8.7) and (8.8) although, its significance falls in equation (8.8). It is only significant at the ten percent probability level. The effect of the second interaction term (*Adjust*AdjustTime*) changes sign from negative to positive in equation (8.8). In this instance, the marginal effect of a higher absolute number of consequential adjustments (*Adjust*) is increased, as adjustment time (*AdjustTime*) increases. Similarly, the marginal effect of a longer adjustment time on performance is increased, with an increase in the number of consequential adjustments. This is an argument for spreading out adjustments to organisational change over time particularly, when a number of adjustments are required. There is no evidence of a performance cost in this instance. However, the effect of this interaction term was insignificant and thus, the result should be interpreted with care.

Reflecting on the set of results presented in Table 8.10, there is evidence of an interaction between the number of precipitating influences of organisational change (*Precipitator*) and the time lapsed between the identification of the first precipitator and the organisational change (*PrecipitatorTime*). The sign of this interaction term is negative indicating that a trade-off exists. There are diminishing returns to adopting a 'wait and see' policy in an effort to identify more precipitators of change. The small firm faces the danger that the real option will no longer be 'in the money'. This interaction effect offers support for the empirical relevance of the real options argument. The effect of the second interaction, between the number of consequential adjustments and the time lapsed between the change and the final adjustment (*Adjust*AdjustTime*), is difficult to interpret given the

switch in signs, from negative to positive, in specifications of equation (8.7) to equation (8.8). Also, the coefficient on this interaction term is not significant. Therefore there is no clear evidence of a trade-off, at least in equation (8.8). There is an argument in equation (8.7) for staging adjustments to organisational change. This lends some support for adopting a real options approach to resource allocation decisions within the firm.

A comparison of equation (8.8) with equations (8.5) and (8.6) was also conducted to test whether the inclusion of the interaction terms raised the variation in performance explained. A likelihood ratio test applied to a comparison of the specification of the model in equation (8.8) with that of equation (8.5) in Table 8.8 produced a χ^2 statistic of 22.76, which is considerably higher than the relevant $\chi^2_{0.05}$ (5) significance point of 11.07. Thus, again here, the preferred specification is the extended model in equation (8.8). However, a likelihood ratio test applied to a comparison of the specification of the model in equation (8.8) with that of equation (8.6) in Table 8.8 produced a χ^2 statistic of 3.45, which is less than the relevant $\chi^2_{0.05}$ (2) significance point of 4.303. Therefore the preferred model specification is equation (8.6). Consequently, it seems that jointly the interaction terms do not explain a significant amount of the variation in performance.

8.5 General Conclusions

This Chapter examined the relationship between two dimensions of flexibility (agility and speed), firm-specific turbulence and the long run prospects of the firm, approximated by the long run performance indicator. It described the calibration of new measures of flexibility and firm-specific turbulence. A Heckman model with sample selection was employed to explain how differences in flexibility and firm-specific turbulence affected the performance of the mature small firm. The estimates suggest that a complex relationship exists between the measures of flexibility and the performance of the long-lived small firm.

Small firms, which can respond to precipitators of change with few changes in their operations, are agile. As expected, agility had a positive effect on performance. To prosper, the small firm should be agile or prepared for organisational change. Contrary to expectations, speed also had a positive influence on performance. An investigation was

conducted, at a micro-micro-level, of the effects of flexibility on performance, to suggest an explanation for this finding. Examining estimates of a Heckman sample selection model, where variation in the components of agility (i.e. *Precipitators, Adjust*) and speed (i.e. *PrecipitatorTime, AdjustTime*) were used to explain performance suggested a more intricate relationship perhaps existed between flexibility and performance. Real options logic was found to be useful in explaining the results.

In interpreting the results, it was found that the mature small firm must be alert to drivers of change. The more precipitating influences identified, the higher is the performance of the firm. Following real options logic, the entrepreneur should hold options until uncertainties are resolved and the value of waiting is at its lowest. Such a strategy reduces downside risk, conserves the firm's resources and raises the flexibility of the firm. However, a trade-off exists; it is in the best interests of the entrepreneur to act quickly in response to precipitators of change, or else it raises the risk of pre-emption, loss of market share etc. Increases in time lapsed between the identification of the first precipitator and the implementation of the organisational change can have negative consequences for performance. Thus, there are diminishing returns to adopting a 'wait and see' policy. Empirical evidence was found of this trade-off, when an interaction term was included to capture this effect, in the Heckman sample selection model.

Once the organisational change was implemented, it was found that the entrepreneur should follow through on all the necessary adjustments. A high number of adjustments were found to raise performance. The process of adjustment should not be undertaken impulsively however. Delays on adjustment were found to have beneficial consequences for performance as they reduce uncertainty and diminish irreversibility. Again in real options logic, the entrepreneur should spread out adjustments to the organisational change. In keeping with this logic, the firm should make small investments initially, and larger investments when the option matures or materialises. This limits the sunk costs in the event of a withdrawal. Concrete evidence of a trade-off relationship between the number of consequential adjustments and the time lapsed between the organisational change and the last consequential adjustment was not found. An interaction term included in the Heckman sample selection model to capture this effect was not significant. Thus, there is no

evidence that extending the time to undertake consequential adjustments has a negative effect on performance.

While firm flexibility generally had a positive influence on performance, firm-specific turbulence had a considerable negative impact on performance. Too much trimming of the activities of the firm has a negative influence on performance. The evidence suggests that a U-shaped relationship exists between firm-specific turbulence and performance. Given the sizeable negative impact of firm specific turbulence on performance, it seems that only a small proportion of firms are experiencing positive dynamics. Small firms in the sample may have passed the long-run test of economic survival, but few have become superior performers.

Firm flexibility is shown to be an important determinant of the performance of small firms. Policymakers, therefore, have an important role to play in promoting small firm flexibility. In this regard, policymakers can educate firms to assess their own flexibility in response to changes, using tools for assessing their flexibility created from models like Table 4.9. With the predictions generated from the general model, the owner-manager can assess whether their scores fall within particular confidence intervals for low, medium and high performance. With this information, the owner-managers can try to improve the operational flexibility of their firms.

This Chapter provides empirical evidence of the relationship between flexibility and performance, using measures calculated across a number of types of changes. Further research could estimate a similar model examining flexibility measures for specific changes. The sample size, in this case, does not enable further microanalysis of this nature, however, predictions can be made from the general model using data on specific measures for different changes.

CHAPTER 9 SIZE, STRATEGY, PERFORMANCE:

A SIMULTANEOUS EQUATIONS ANALYSIS

9.1 Introduction

It has been observed that few small firms grow to become fast growth firms or 'gazelles' (see Storey, 1994, 1996; Birch, 1996)[1]. In general, there is a tendency for small firms to remain small. It was seen in Chapter 5 that the average size of the long-lived small firm in the sample grew from typically having less than 10 employees (3.57 FTEs) at inception to having almost fourteen (13.55 FTEs) at maturity (an average age of 26 years). The modal firm type is still the micro-firm as the average size is somewhat raised by the existence of a few large firms in the sample. This hardly represents substantial growth over the period. It is difficult to argue that inefficiencies in the market fostered the survival (or success at 'the first hurdle') of these small firms, given the long period of time over which they have been examined. Only the fittest firms survive as the market selection process works out (Gould, 1993). This suggests that there are other factors in play that explain why many small firms don't go on to clear 'the second hurdle' of growth in firm size.

To date empirical studies have deliberated over the characteristics of fast growing firms rather than examining the tendency of small firms to remain small (see Delmar *et. al*, 2003; Almus, 2002; Brüderl and Preisendörfer, 2000; Storey, 1996, 1997, 1998a,b; Birch, 1996; Seigel *et al.*, 1993; Smallbone *et. al*, 1992, 1995; Leigh *et al.*, 1991). Fast growing firms, according to Storey (1994), are direct providers of new employment opportunities in the small firm sector. He found that 4% of the fast growing firms in his sample create about 50% of the employment in this cohort over a decade. This is perhaps one justification for the focus of these studies. However, as stated in Chapter 1, long-lived small firms provide continued employment in communities and create positive externalities for these communities over extended periods of time. As the vast majority of these firms remain small-scale operations, it is important to examine why they sustain their small-scale existences. This Chapter addresses this gap in empirical work by investigating the tendency of small firms to remain small. It will be shown how the joint actions of firm size, performance and other factors, interplay in a way which discourages growth in the scale of the small firm. The latter include the size of the market for its product (e.g. local service) and the level of differentiation of its product (e.g. customised). It provides a micro-econometric analysis of the tendency of

[1] Storey (1996, 1997, 1998a,b) describes them as the 'ten percenters' because they are few in number. Birch (1996) describes them as 'gazelles' because of they apparently effortless performance.

small firms to pursue strategies which limit their growth in size, in order to survive and prosper in the market place.

Specifically, this Chapter examines *two* behavioural relationships between size, strategy and performance. These two relations are used to test the central hypothesis that there is a tendency for small firms to remain small. The first examines the relationship between firm size, the extent of the firm's main market (local to international markets) and performance. The second considers the relationship between firm size, the diversity of the firm's competitive strategy and performance. These relationships are estimated using simultaneous equation models.

Earlier work on small firms concentrated on firm size, particularly on the relationship between growth and firm size originating in the Law of Proportionate Effect (or Gibrat's Law), see Section 3.2. Chapter 5, subsection 5.2.5 presented evidence of shifts in the scale of the small firms operations over the life of the firm using models inspired by Gibrat's Law. Smaller SBEs in the sample were found to grow faster than larger SBEs early in their lifecycle phase to reach the so-called minimum efficient size (MES) of production. However, after approximately 5 years of trading there was evidence in support of Gibrat's Law, at least for real turnover, implying that all SBEs grew at the market rate (i.e. independent of firm size) from that point on. Yet, the models on which these results are based are mechanistic in nature. Modern variants have tried to overcome this by including other firm specific characteristics, which may influence growth, as additional regressors. These characteristics included ownership structure (Dunne *et al.* 1989a; FitzRoy and Kraft, 1991; Variyam and Kraybill, 1992), R&D, innovative activities and new technology (Hall, 1987; FitzRoy and Kraft, 1991; Doms *et al.*, 1995; Liu *et al.*, 1999), financial structure (Heshmati, 2001), human capital embodied in the owner-manager (Heshmati, 2001; Liu *et. al*, 1999; McPherson, 1996) and export activities (Liu *et al.*, 1999), see Subsection 3.3.4 However, this analysis has not been extended to examine the joint determination of size, and strategies which limit the size of the firm and performance, within a simultaneous equations model.

Managerial theories of the firm explicitly examined trade-offs between the growth of the firm and performance (see Penrose, 1959; Marris, 1964; Richardson, 1964; and Slater, 1980). Such 'costs to growth' were examined in Chapter 2, Subsection 2.5.1.

Evidence of a negative relationship between growth and profitability is mixed. For instance, studies by Cowling (2004), Dobson and Gerrard (1989), Cubbin and Leech (1986) did not find clear evidence of a trade-off between growth and profitability. This is despite evidence of a negative (but insignificant) relationship between the rate of profitability and growth in assets in a 2SLS estimation of the growth model by Dobson and Gerrard (1989) and Cubbin and Leech (1986)[2]. However, Reid (1993, 1995, 1998) found evidence of a growth profitability trade-off for a sample of small business start-ups within a simultaneous framework suggesting that there are diminishing returns to increasing firm size. Nevertheless, these earlier models can benefit from being extended to include other sources of endogeneity.

Other factors may influence the size performance relation. Lucas (1978) proposed that there is an infinity of optimal firm sizes distributed increasing in the managerial talent of the entrepreneur. Managerial ability places a constraint on the size of the firm as it exhibits diminishing returns to scale or to the span of control. For a sample of Dutch individuals Van Praag and Cramer (2001) find that risk aversion is a serious impediment to entrepreneurship but that success in entrepreneurship requires intelligence and general ability, with size of the workforce as the indicator of success.[3] Other factors include the motivation of the entrepreneur, financial constraints and lack of skilled labour. Most of these barriers to growth, according to Barber *et al.* (1989), are internal to the firm, (see Subsection 2.5.2 for more detail).

In this Chapter, *Size* is measured by the number of full-time equivalent employees. *Main market* is a categorical variable, which identifies the main market for the principal product group (which may range from local to international markets) (see Subsection 5.3.1). *Competitive Strategy* is measured using a count variable of the competitive strategies (price and non-price) pursued by the small firm in their principal market (see Subsection 7.2.2). *Performance* is measured using the self-appraised multidimensional

[2] Firm size was included as an exogenous explanatory variable in the growth and profit equations estimated by Dobson and Gerrard (1989) and in the profit equation estimated by Cubbin and Leech (1986) and Cowling (2004). It was found to have a negative (and insignificant) coefficient in growth equation indicating that smaller firms grow at faster rates and a positive (and insignificant) coefficient in the profit equation indicating that larger firms earn higher rates of profit. Firm size was not included as a regressor in Reid (1993, 1995, 1998). This may explain the mixed evidence of a growth profitability trade-off. In this study, firm size is treated as the endogenous regressor as opposed to firm growth.

[3] Van Praag and Cramer (2001) extend Lucas's model by assuming that individuals are uncertain of their entrepreneurial talent in choosing occupations. They choose the occupation which renders the highest expected utility given their attitude to risk and differences in their characteristics. Firm size is determined by the managerial ability of the entrepreneurs.

scale (see Subsection 6.3). A detailed account of how these variables were measured is reserved until Section 9.3.

System estimation is adopted because it is difficult to disentangle one relationship from the other using single equation estimators in the presence of contemporaneous correlations and simultaneities. There is an inherent 'lack of identification' if single equation methods are adopted. To enhance the efficiency of estimation, and for comparative purposes, several system estimation techniques are reported. These are: seemingly unrelated regression (which corrects for contemporaneous correlations); two stage least squares (which corrects for endogeneity but not contemporaneous correlations); three stages least squares (which corrects for endogeneity and contemporaneous correlations); and generalised method of moments (which corrects for endogeneity, contemporaneous correlations and heteroscedasticity). This enables the robustness of the estimates across different techniques to be investigated. Other recent applications of a simultaneous equations approach in industrial organisation include Jans and Rosenbaum (1997), Beccarello (1996) and McDonald and Bloch (1999).[4]

Briefly, the Chapter is structured as follows: Section 9.2 examines the behavioural models to be estimated. Section 9.3 describes the variables used in estimation. Section 9.4 reports on Durbin-Wu-Hausman type tests of exogeneity, employed to examine whether simultaneities exist within each system. In this Section, the techniques for system estimation are also outlined and evaluated. Section 9.5 reports the results of system estimation techniques. This Section also examines adjustments of size, main market, competitive strategy and performance within the simultaneous systems. Finally, Section 9.6 reports on the principal conclusions of this Chapter.

9.2 The Model

Two behavioural models are considered. Each behavioural model examines the relation between firm size and performance. This relation is augmented to examine further influences like the firm's market extent, and the heterogeneity of the firm's

[4] Jans and Rosenbaum (1996) use nonlinear three stage least squares to estimate quantity and price equations. Beccarello (1996) used three stage least squares to estimate mark-up equations. McDonald and Bloch (1999) use instrumental variables to estimate the spillover effects of an industrial growth/performance trade-off model.

competitive strategy. This Section provides some amplification of the key behavioural models being addressed.

9.2.1 Behavioural Model I

The first behavioural model examines the relationship between firm size, the extent of firm's main market and performance. In general terms, the three-equation model is specified as follows:

$$P = f(S, M, X_1) \quad (9.1)$$
$$-, \ +$$

$$S = h(P, M, X_2) \quad (9.2)$$
$$-, \ +,$$

$$M = g(S, P, X_3) \quad (9.3)$$
$$+, \ ?$$

where, P is a measure of the firm's performance, S is a measure of firm size, M is a measure of the extent of the firm's main market and X_I represents exogenous variables.

In equation (9.1), size is expected to affect performance negatively assuming that a trade-off exists between size and performance. This trade-off encourages owner-managers of small firms to reduce headcount to achieve greater efficiency. Such efficiency gains arise from greater labour productivity, often with an increase in the human capital of the remaining workforce. The substitution of capital for standard labour inputs is another potential source of efficiency gain. A further source of efficiency is a reduction in agency costs as a consequence of lesser need for monitoring and lower levels of hierarchy (see Reid, 1998, 1992). Market extent, M, is expected to influence performance positively, as larger main markets offer the prospect of growth as a consequence of economies of scale (Reid, 1994, 1995, 1998). X_I here represents attributes of the financial structure of the firm, the diversity of the firm's competitive strategy, aspects of its market and age.

Equation (9.2) represents size as a function of performance, market extent and other exogeneous variables. Based on previous evidence, and managerial theories of the firm, a negative relationship is expected between size and performance (suggesting a trade-off between size and performance). Market extent is expected to have a positive influence on firm size. Reid (1993) in examining new firm start-ups found that the less

the dependence on local markets (or put another way the greater the nationality of markets) for the main product, the greater the growth rate, other things being equal. Using evidence based on 150 Scottish small business start-ups gathered from 1994 – 1997, Reid (2001) found that growth is restricted unless firms start with marketing intentions aimed at national or international markets. Without this the small firm will never make major markets. Further, the choice of market extent is path dependent, and there are lock-in effects (see Subsection 2.5.3). An initial decision to serve local markets may therefore limit the future size of the small firm. A firm needs to adopt a strategy aimed at international markets early in its lifecycle if it is to continue on this road. Geographical expansion as a means of small firm growth, a neglected area of small business research, presents a number of difficulties for owner-managers (see Barringer and Greening, 1998). Through an examination of five case studies, Barringer and Greening (1998) found that effective business expansion requires careful planning for growth, the identification of suitable locations, the management of growth (hiring and motivating new staff) and learning and flexibility. In equation (9.2), X_2 is a vector which represents a lagged performance variable, market variables and the extent of the firm's administrative organisation.

Equation (9.3) expresses size and performance as a function of market extent. Firm size is expected to positively influence market extent based on arguments above. The effect of increases in performance on market extent is unknown and to be investigated. X_3 incorporates market structural variables to approximate the extent of competitive pressure in the firm's principal market.

Essentially, this three-equation model allows one to examine: (a) the existence of a trade-off between firm size and performance; and (b) the effect which market extent has on this trade-off. In general, it might be expected that the greater the extent of the firm's main market, the greater is firm size, and the higher is performance. However, to gain improvements in performance, the reverse may be necessary: the firm may need to become leaner in size. Such firms might be expected to serve more localised markets better.

9.2.2 Behavioural Model II

The second behavioural model considers the relationship between firm size, heterogeneity of the firm's competitive strategy, and performance. In general terms, the three-equation model is specified as follows:

$$P = f(S, C, X_4) \quad (9.4)$$
$$\quad -, +$$

$$S = h(P, X_2) \quad (9.5)$$
$$\quad -$$

$$C = j(P, X_5) \quad (9.6)$$
$$\quad ?$$

where C is an index of the heterogeneity of the firm's competitive strategy and the other variables are defined as above. In equation (9.4) again, size is expected to affect performance negatively. The heterogeneity of the firm's competitive strategy, C, is expected to influence performance positively. Thus, it is expected that the greater the number of dimensions along which the mature small firm competes, the higher is the performance of the firm. A focus strategy in which the firm competes on many dimensions has been found to confer the small firm with a performance advantage. Hence, Reid (1993, p. 119) claimed that Porter's (1985) focus strategy was "*most likely to offer the SBE a competitive advantage*": that is a strategy which is targeted to serve fully the needs of a very specific group of customers. Wright *et al.* (1995) recommended that focus or niche strategies were more appropriate for small firms, because entry barriers were lower. Carter *et al.* (1994) found that small firms prefer to focus on niche markets made up of geographic, customer or product segments. Caplin and Nalebuff (1986) show that a high cost firm, by locating well away from the centre of the market, may be able to avoid destructive competition with its low cost rival and guarantee itself a market niche. Porter's (1985) ideas on 'good competitors' also explain the positive effect of the size of the competitive strategy space on performance. Such competitors, by engaging in sharp and challenging rivalry, actually promote the efficiency and innovativeness of incumbent firms, and hence improve their prospects of staying in business. In equation (9.4), X_4 represents attributes of the financial structure of the firm, aspects of its market and age similar to X_1 above.

Equation (9.5), which represents size as a function of performance, is now familiar ground and does not require any further explanation. Equation (9.6) represents

competitive strategy space as a function of performance, and other exogenous variables. The direction of the impact of performance upon the size of the competitive strategy space is unknown, and requires investigation. X_5 like X_3 incorporates market structural variables to approximate the extent of competitive pressure in the firm's principal market.

9.2.3 Conclusions

The hypothesised trade-off relationship between size and performance expressed in the behavioural models above suggests that to attain higher performance the small firm must limit its size: decreases (increases) in firm size may raise (reduce) the performance of the firm. Arguably, it is this performance driven effect, which tends to limit the size of the firm: it may encourage owner-managers to reduce headcount to achieve greater efficiency. Smaller firms are expected to serve more localised or niche markets. One way of engaging in the latter is through cultivating more varied competitive strategies. By taking this approach, the firm is seeking to raise its performance.

9.3 Variables

This section presents information on the variables used in econometric estimation. It presents summary statistics on the key variables used in equation (9.1) to equation (9.6) above (see Table 9.1 below). A brief account is provided of how these variables are defined. For more information on the design and description of these variables the reader is referred to Chapters 4, 5, 6 and 7 respectively. The endogenous variables in each behavioural model are examined initially. Exogenous variables X_i are then examined. This Section also provides some amplification of each structural equation to be used in estimation reported on in Section 9.5.

9.3.1. Endogenous Variables

There are three endogenous variables in each behavioural model, two of which are size, S, and performance, P. The other endogenous variables include main market, M, and the heterogeneity of the firm's competitive strategy space, C, depending on the behavioural model which is being examined. Turning now to examine each of these variables in a brief way.

Table 9.1: Mean, standard deviation and range of each variable

	Variable	Definition	Mean	Std. Dev.	Min.	Max.
Endogenous	P	= $\sum f_i/n$ where f_i is the self appraised score between 0-100 for each factor averaged overall factors 1 to n which were applicable.	67.3467	8.1036	49.11	90.43
	S	Number of full-time equivalent employees in 2001.	13.6508	19.8488	1	130
	M	=1 (Local), =2 (Regional), =3 (Scottish), =4(British/International)	2.2698	1.2599	1	4
	C	= $\sum f_i$ where f_i are forms of competition used by the firm in their principal markets	4.5397	1.8035	1	8
Exogenous	LP_{St}	= [Sales at first interview (1985 for SBE, 1991 for telephone, 1994 for Leverhulme) at 2001 prices]/ [Employees at first interview (1985 for SBE, 1991 for telephone, 1994 for Leverhulme) at 2001 prices]	113489	125103	1780	549577
	Age	Age of firm, in years.	25.5397	15.7284	10	90
	Mriv	= The number of major rivals	26.0318	126.1867	0	1000
	MSh	=1 (Under 1%), =2 (1-5%), =3 (6-10%), =4 (11-20%), =5 (21-30%), =6 (31-50%), =7 (Over 50%)	3.9841	2.4263	1	7
	OC	= $\sum f_i$ where f_i are the activities performed in the firm	7.2381	2.1381	3	11
	D	= $\sum f_i$ where f_i are forms of debt used by the firm in their principal markets	1.8254	1.4429	0	4
	Diff	=1 (Identical), =2 (Similar), =3 (Different), =4 (Cannot say)	2.1746	0.7733	1	4

It was seen in Chapter 6 that there are several approaches to measuring performance. Here performance, *P*, is approximated using the quantitative indicator of long run performance, a measure of fitness to survive over the long haul (see Section 6.3). This measure was calibrated by summing scores from owner-manager's self-appraisals of 28 items covering aspects of the competitive environment, financial management, organisational structure, and business strategy. It is argued that this novel measure is both more comprehensive, and more compatible with our evidence base. This performance variable ranges form 49 to 90 out of a potential score of 0-100. A larger score indicates higher performance. On average, mature small firms in the sample received a score of 67. It is envisaged, that following changes in judgement of prospective firm performance, the owner-manager modifies factors like size and market extent etc. to enhance performance. Thus, this variable is expected to be endogenous within each simultaneous equations system.

The second endogenous variable in the model is firm size, *S*, and it is approximated by full-time equivalent employees. As with performance, there are several approaches to measuring firm size. The analysis was repeated using assets and sales, and similar results were found to those reported in Section 9.5. In 2001 these mature small firms were, on average, just above the size of the micro-firm (13 FTEs), generating £835,000stg. in turnover using assets valued at £330,000stg. Reid (1993) found that size measures, like assets and number of full time employees, early in the life of the firm in single equation models, had less obvious theoretical consequences for firm survival and were less useful predictors of survival. Here, Reid's (1993) approach is extended to examine interrelationships between size, factors constraining growth and long run performance, all in a larger simultaneous equations system. In this way, a further understanding is gained of the relationship between firm size and performance and the tendency for new business starts to remain small.

The third endogenous variable, main market, *M*, is a categorical variable, which identifies the main market for the principal product group. It ranges from 1 to 4, where 1 denotes more local markets and 4 denotes national or international markets. Typically, firms operated in localised markets. Nearly a half (46%) of the firms in the sample operated in local markets, few (3.2%) in regional markets, over a quarter (28.6%) in the Scottish market, about one fifth (19%) in the UK and few (3.2%)

internationally. More than 50% operate in markets other than those that are local, with the largest proportion selling to the Scottish market. It was found (see Subsection 5.3.1) that firms may expand their market extent, but that there was some dependence between the firm's choice of market extent at start-up, and the firm's market extent in 2001.

The final endogenous variable measured the size of the competitive strategy space of the firm, *C*. This variable is calibrated by a count of the number of forms of competitive strategies adopted by the firm. This variable ranges from 1 to 8 where '1' indicates that the small firm competes based on just one dimension of the competitive strategy space (e.g. price or quality) and '8' that the firm competes across many dimensions (e.g. price, quality, delivery). On average, the small firms competed on 4.5 dimensions. In Subsection 7.2.2, a significant difference was found in the mean size of the competitive strategy space for different levels of differentiation. Higher values of this variable, *C*, represent a more differentiated strategy and a greater willingness to compete. A firm, which actively competes in this way, is expected to improve performance.

9.3.2 Exogenous Variables

There are a number of exogenous variables in each behavioural model to improve the specification, goodness of fit and to help identify the system, in a statistical sense. These are examined for each equation in turn.

9.3.2.1 Performance Equation $P=f(.,X_i)$

The exogenous variables X_i in the performance equation, represents attributes of the financial structure of the firm, features of its market and age. Other industry (e.g. sector), structural (e.g. level of market share, the number of major rivals and the description of competition in the principle market), strategy (e.g. level of product differentiation and the level of information technology) variables were initially included in this equation, but were dropped because they did not significantly determine performance.

A feature of the financial structure of the firm was captured by a variable which measures the level of liabilities of the firm, *D*. Liabilities, *D*, are approximated by a count variable of the number of forms of debt that the firm had incurred. This variable ranges from 0 to 4, where '0' indicates that the firm has no debt, and is financed by personal equity and retained earnings with an implied gearing ratio of zero. For a

higher level of external liabilities, a lower level of performance is expected. Indeed, Reid (1999) found that a bank loan, which requires debt servicing with its associated costs and risk, had a significant negative effect upon the probability of survival for a sample of Scottish small business start-ups. Over two thirds (68.3%) of mature firms interviewed were being financed through some form of debt. On average, these firms had taken on two forms of debt (e.g. bank loan, bank overdraft). This was the main source of finance, apart from private equity (see Subsection 6.2.3).

Market variables, such as technical change and, where appropriate, market extent, *M*, and the diversity of the firm's competitive strategy, *C*, were treated as exogenous. Market extent, *M*, and the diversity of the firm's competitive strategy, *C*, were described above and consequently are not discussed again here. The level of technical change in the industry, *T*, is a dummy variable, which takes on the value of '1' when the industry in which the firm operates experienced technical change over its life and '0' otherwise. Fifty-two (82.5%) of the firms interviewed experienced technical change in their industry over the life of the firm. Industry-wide technical change has an important effect on the long run survival prospects of the firm. Winter (1984) and Gort and Klepper (1982) show that the technological and knowledge conditions determine the relative ease with which new firms are able to innovate and therefore survive (see Subsection 3.3.1.2). Audretsch (1995) illustrated the disparate effect a highly innovative environment exerts on the post-entry performance of new entrants. Those firms, which are able to adjust and offer a viable product apparently, experience higher rates of growth and a greater likelihood of survival. However, entrants that are not able to adjust and supply a viable product are confronted by a lower likelihood of survival. In fact, at a more micro-level, Reid (1999) found that either not using new technology at all or even perceiving one's capability to implement new technology to be good had a significant and considerable negative effect upon new business survival.

Age, *A*, as a variable is fairly self-explanatory. The survival and success of the small firm may be attributed to the experience of the owner-manager accumulated by the practice of running the firm (see Reid, 1999; Evans, 1987 a, b; Dunne *et al.* 1989a; Dunne and Hughes, 1994; Heshmati, 2001). The owner-manager may initially be unaware of his ability, but, over time his ability is revealed, at the same time as his skill is acquired, see Jovanovic (1982). This introduces time dependence into the

performance growth relationship: the age of the SBE is also a determinant of its growth rate as well as its size (see Evans 1987a, b; Liu *et. al.*, 1999; Reid, 1993; Dunne *et. al.* 1989a, Variyam and Kraybill, 1992; Dunne and Hughes, 1994). The average age is about 26 years, (roughly one generation) and no firm was younger than 10 years old. The maximum age in the sample was 90 years (roughly three generations), see Subsection 5.2.2.

Performance equations (9.1) and (9.4) have five exogenous variables. X_i varies depending on the behavioural model being examined. X_1 includes *T, C, D, A* and A^2 as exogenous variables. X_4 includes *T, M, D, A* and A^2 as exogenous variables. It is noted that *C* is treated as exogenous in the specification of behavioural model I and *M* is treated as exogenous in the specification of behavioural model II.

9.3.2.2 Size Equation $S=h(.,X_2)$

The exogenous variables in the size equations (9.2) and (9.5) are: the level of technical change in the industry, *T*, described above; the labour productivity of the mature small firm at start-up, LP_{st}; and the scope of the administrative organisation of the firm, *OC*. Labour productivity early in the life of the firm (LP_{st}), is a ratio of sales to employees, as measured in the first interview at constant 2001 prices. It is predetermined and assumed to be exogenous. It is a measure of the operational efficiency of the firm earlier in its life. Firms which generate more sales per fulltime equivalent employees, are more operationally efficient. Greater operationally efficiency, early in the life of the firm, indicates superior performance at this stage. Superior performers might be expected to grow in size (see Aw, 2002). This may not be the case, however, as firms grow faster early in their lifecycle compared to later (see Subsection 5.2.5 for evidence on lifecycle effects in labour productivity). On average, firms made £113,489stg. per fulltime equivalent employee at this stage in their life (ranging from £1,780stg. to £559,577stg.) in 2001 constant prices.

The scope of the administrative organisation of the firm (*OC*) is approximated by a count variable of the functional activities (e.g. production, accounting, I.T. support, sales, marketing, product innovation, strategic planning etc.) performed within the firm.[5] The variable ranges from three to eleven, where '3' is a low level of internal

[5] Penrose's (1959) conceptualisation of the nature of the firm as a collection of physical and human resources whose services are made more or less complementary and thereby productive by (and specific to) the firm's coherent administrative organisation is still relied upon. It is argued that the unique

organisation and '11' a high level of internal organisation (e.g. a large number of functions are performed internally). On average, firms engage in seven functional activities (σ=2.138). Typically, the larger the number of these functional activities, the greater is the division of labour, and the larger is the expected firm size. Thus, the scope of the administrative organisation is expected to have a positive influence on size. Indeed, the scope of the administrative organisation is significantly positively correlated with firm size (Pearson's R =0.384 at a p-value=0.001 in one tail).

According to Ghoshal *et al.* (2000), firm growth is portrayed as the outcome of "*a symbiotic process of resource accumulation and administrative organisation, a process... that induces its own creating and destroying actions from within*" (p.146). A reorganisation of the administrative organisation involves rebundling activities, and internalising the various stages of the good and services value chain. This is perhaps a long run effect. Penrose (1959) argues that growth in the short run of the small firm is likely to be limited by the small number of possibilities that stem from the firms own limited resources and competition for their resources. In fact, while testing the growth efficiency trade-off, Reid (1994) found that as the SBE ascends the ladder of firm structure (as measured by the business type), it does so, in the short run, at the sacrifice of SBE growth.

9.3.2.3 Market Extent Equation M= g(S, P, X_3)

In equation (9.3), the market extent equation, the set of exogenous variables, X_3, includes: the number of major rivals in its main market, *Mriv*; and the market share for the firm's principal product, *MSh*. The number of major rivals, *Mriv*, aims to provide a simple index of competitive pressure. In general, the greater the number of major rivals, the greater the competitive pressure. Even with an average of just 26 major rivals this pressure can be intense. Indeed, at extremes, it can be destructive (see Reid, Jacobsen and Andersen, 1993). Thus, increases in the number of major rivals are expected to entice the firm to pursue a differentiated strategy, and to seek to enter niche markets where there is less competition. Market share, *Msh*, is a categorical variable, which identifies the market share for the principal product group (as measured by proportion of sales). It ranges from 1 to 7 where '1' indicates a low market share and

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collection of resources that make up any firm provides both an inducement to expand and a limit to the rate of expansion for the firm.

'7' represents a high market share. It is assumed that the higher the firm's market share, the greater is the firm's opportunity to exercise market power, and therefore the easier it is to achieve growth, see Caves and Porter, (1977), Reid, (1994). Typically, small firms have a low market share in competitive markets or on the fringe of a co-ordinated oligopoly (e.g. a price leadership group). Some may seek and achieve a large market share of a small market niche, which itself is unattractive to larger firms. Examples would include local markets in fresh produce. However, such local markets have a limited size which curtails the potential scale of the firm. Nearly a quarter of the firms (23.8%) had a market share of less than one percent. Nevertheless, the variation ratio at 77.2% is high, implying that over three quarters of the mature small firms had a larger share of smaller markets.

9.3.2.4 Competitive Strategy Space Equation C= j(P, X_5)

The set of exogenous variables in equation (9.6), the competitive strategy equation, represent attributes of the firms principal market: the number of major rivals in its main market, *Mriv*; and the level of product differentiation, *Diff*. Product differentiation, *Diff*, is a self-appraised measure of differentiation. It was scaled to be higher the greater the product heterogeneity. In this sample, the mature small firm typically sold similar, but not identical, products to its competitors. Most tried to differentiate their products. Out of the sample of 63 firms, 11 (17.5%) produced or sold identical products or services to competitors. Over a half (52.4%) produced or sold similar products and just over a quarter (25.4%) produced or sold different products. The question seems to be well understood, as only 3(4.8%) could not say either way.

9.3.3 Structural Equations

The two behavioural models are summarised by equations (9.1) to (9.6). These models are amplified here in equations (9.7) to (9.12). They now explicitly incorporate the exogenous variables discussed above. In equations (9.7) to (9.12), the functions *f(.), h(.), g(.), j(.)* are expressed in linear forms with additive disturbance terms $u_i(i=1,2,..)$ The structural equations *f(.), h(.), g(.)* to be estimated for behavioural model I are as follows:

$$\mathbf{P_t} = \beta_0 + \beta_1 S_t + \beta_2 T_t + \beta_3 C_t + \beta_4 D_t + \beta_4 M_t + \beta_5 A_t + \beta_6 A_t^2 + u_1 \qquad \textbf{(9.7)}$$

$$\mathbf{S_t} = \alpha_0 + \alpha_1 P_t + \alpha_3 LP_{St} + \alpha_4 OC_t + \alpha_5 T_t + \alpha_5 M_t + u_2 \qquad \textbf{(9.8)}$$

$$M_t = \delta_0 + \delta_1 P_t + \delta_2 S_t + \delta_3 Mriv_t + \delta_3 Msh_t + u_i \quad (9.9)$$

whereas the structural equations *f(.), h(.), j(.)* to be estimated for behavioural model II are[6]:

$$P_t = \beta_0 + \beta_1 S_t + \beta_2 T_t + \beta_3 C_t + \beta_4 D_t + \beta_4 M_t + \beta_5 A_t + \beta_6 A_t^2 + u_4 \quad (9.10)$$

$$S_t = \alpha_0 + \alpha_1 P_t + \alpha_3 LP_{St} + \alpha_4 OC_t + \alpha_5 T_t + u_5 \quad (9.11)$$

$$C_t = \gamma_0 + \gamma_1 P_t + \gamma_2 Mriv_t + \gamma_3 Diff_t + u_6 \quad (9.12)$$

Equations (9.7) and (9.10) are identical except for the assumptions about which variables are endogeneous and exogeneous.

Initially, *a priori* considerations were used to classify variables as either exogenous or endogenous. Indeed, the selection of *P, S, M,* and *C* as endogenous arises as much from the extant literature, as from statistical considerations. However, once *a priori* knowledge has been incorporated in the model, its legitimacy needs to be explored econometrically. Therefore, formal tests for endogeneity within the system are examined in the Section 9.4, immediately below.

9.4. Methods

This Section reports on two matters: (a) Durbin-Wu-Hausman (henceforth DWH) type tests of exogeneity to examine whether simultaneities exist between firm size, small firm performance and the other endogenous variables *M* and *C*; and (b) the evaluation of appropriate system estimation techniques. Sample size prohibits us from examining all sources of endogeneity in one system (see Phillips, 1983) thus the DWH tests are conducted for each of the behavioural models outlined in equations (9.7) to (9.12).

[6] It should be noted that the variable main market, M_t was dropped from the size equation (9.11) because evidence of endogeneity was found between size and main market i.e. *S=f(M)* and *M=g(S).* using Durbin-Wu-Hausman tests. Thus to include M_t in this equation would lead to inconsistent estimates of behavioural model II.

9.4.1 Tests of Endogeneity

Simultaneities between endogenous variables in a system of structural equations induce a correlation between the regressors, *X*, and the error terms, *u*, of each equation of the system. This violates one of the assumptions of the classical linear regression model [i.e. the assumption that $\sum(X\ u_t) = 0$]. It is not always clear from theory whether certain explanatory variables are endogenous; or, if theory indicates that certain variables should be endogenous, whether the correlation with the error term is likely to be great enough that using least squares will result in serious bias. Thus, it is important to assess whether variables in our structural equations are endogenously determined. Here, DWH type tests are applied to investigate whether the set of estimates of the structural equations obtained by least squares are consistent or not.[7] If the null hypothesis that OLS estimates are consistent is rejected, endogeneity (not every regressor is asymptotically independent of the disturbances) is present and the IV estimator is preferred to the least squares estimator[8] (Davidson and MacKinnon, 1993, p.237). Failure to reject the null hypothesis suggests that there is no need for structural modelling but failure to reject it may or may not imply endogeneity (see Geroski, 1982, p.150). Only under very special conditions will failure to reject be compatible with exogeneity. Hence, it is convenient to regard failure to reject as only indicative of exogeneity.

DWH tests for endogeneity were conducted for each behavioural model. The tests were conducted first to examine whether the endogenous variables showed evidence of endogeneity. Then DWH tests were conducted for the other exogenous variables in each behavioural model. The latter was done under the assumption that the endogenous variables in the behavioural model were infact endogenous, whether this

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[7] In practice the test is implemented as follows: Suppose a structural equation is

$$y_1 = \delta\ X_1 + \beta y_2 + u$$

where $y_1$and y_2 are vectors of suspected endogenous variables, X_1 is a matrix of exogenous and predetermined variables, and u a vector of error terms. Let $\hat{y}_2$ be the vector of fitted values of y_2 from a reduced form regression of y_2 against all the exogenous and predetermined variables in the system. The DWH test is simply an F test that the coefficient π on $\hat{y}_2$ is equal to zero (i.e. test $\hat{\pi} = 0$) in an estimation of the following regression $y_1 = \delta\ X_1 + \beta y_2 + \pi\hat{y}_2 + u$.

[8] In the absence of endogeneity, the least squares is the preferred estimator, as the asymptotic covariance matrix of the least squares estimator is never larger than that of IV estimator. The asymptotic covariance matrix is smaller *unless* endogeneity exists (see Greene, 2000 p.383).

was based on statistical criterion, or *a priori* considerations from economic theory. The DWH tests are examined for each behavioural model in turn below.

No evidence of endogeneity between M_t, S_t and P_t was found for equations (9.7) to (9.9) using the DWH test, and a 5% significance level (see Table 9.2). According to theoretical criteria, there is some evidence of endogeneity between M_t, S_t and P_t, but given these results of the DWH tests, it is not large enough to lead to inconsistent estimates. We turn now to DWH tests for the exogenous variables in this system. Labour productivity earlier in the life of the firm, LP_{st}, and age, A_t, are predetermined within the system and are known to be exogenous. DWH tests were performed to test the exogeneity of the other variables in the system, namely, the level of liabilities of the firm, D_t, the diversity of the firm competitive strategy space C_t, industry technical change, T_t, the scope of the administrative organisation, OC_t, the number of major rivals, $Mriv_t$, and the level of market share, Msh_t. From Table 9.2 it is seen that the variables D_t, C_t, T_t, OC_t and Msh_t are clearly exogenous. There is some evidence of endogeneity of $Mriv_t$ at the 5% level but this seems to be unidirectional in nature [$M_t=g(Mriv_t)$ but $Mriv_t \neq g(M_t)$] [9] and thus is not explicitly modelled here.

[9] $F_{(1,56)}$ statistic = 0.58, p –value = 0.4489 thus Ho $\beta_m=0$ could not be rejected

Table 9.2: Behavioural Model I: Durbin-Wu-Hausman Tests

Test for Evidence of Endogeneity								
	EQN (9.7)			EQN (9.8)			EQN (9.9)	
Test Variable	S_t	M_t	Test Variable	P_t	M_t	Test Variable	P_t	S_t
F-value $_{(1, 53)}$	2.19	0.64	F $_{(1, 55)}$	1.35	0.3	F $_{(1, 58)}$	2.06	0.17
Prob >F	(0.1452)	(0.4268)	Prob >F	(0.2499)	(0.5862)	Prob >F	(0.1564)	(0.6782)

Test for Evidence of Exogeneity (S_t, M_t and P_t are assumed to be endogenous)							
	EQN (9.7)			EQN (9.8)		EQN (9.9)	
Test Variable	D_t	C_t	T_t	T_t	OC_t	$Mriv_t$	Msh_t.
F-value	0.14	0.56	0.62	0.71	0.78	5.03	0.06
Prob >F	(0.7067)	(0.4568)	(0.4346)	(0.404)	(0.3796)	(0.0290)	(0.8019)

Note: The F statistics (and associated probability values in parentheses) testing the null hypothesis that the coefficients on the fitted values of relevant test variable (obtained from regressions against all the exogenous variables in the system) are zero.

For the behavioural model II, some evidence of endogeneity was found between size and performance, $S_t=h(P_t)$, and diversity of competitive strategy space and performance, $C_t=j(P_t)$ (see Table 9.3). This statistical evidence confirms *a priori* reasoning. As a result, theoretical and statistical criteria can be invoked to support system estimation in this case. Tests were performed for the exogeneity of the other variables in the system (except LP_{st} and age, A_t). They would lead us to regard the D_t, M_t, T_t and $Mriv_t$ variables as clearly exogenous. There is some evidence of endogeneity of OC_t at the 5% level[10] and $Diff_t$ at the 10% level[11] but this seems to be unidirectional in nature and thus is not explicitly modelled here.

[10] $F_{(1,60)}$ statistic = 0.01, p-value =0.9220, thus Ho β_s=0 could not be rejected

[11] $F_{(1,58)}$ statistic=1.83, p-value =0.1890, thus Ho β_c=0 could not be rejected

Table 9.3 Behavioural Model II: Durbin-Wu-Hausman Tests

Test for Evidence of Endogeneity							
	EQN (9.10)		EQN (9.11)		EQN (9.12)		
Test Variable	S_t	C_t	Test Variable	P_t	Test Variable	P_t	
F-value $_{(1, 53)}$	2.12	0.99	$_{(1, 57)}$	8.2	$F_{(1, 58)}$	3.35	
Prob >F	(0.1511)	(0.3236)	Prob >F	(0.0058)	Prob >F	(0.0722)	
Test for Evidence of Exogeneity (S_t, C_t and P_t are assumed to be endogenous.)							
	EQN (9.10)			EQN (9.11)		EQN (9.12)	
Test Variable	D_t	M_t	T_t	T_t	OC_t	$Mriv_t$	$Diff_t$.
F-value	1.58	1.12	0.02	0.41	6.671	1.51	3.30
Prob >F	(0.214)	(0.2954)	(0.8794)	(0.5228)	(0.0119)	(0.2241)	(0.0746)

Note: The F statistics (and associated probability values in parentheses) testing the null hypothesis that the coefficients on the fitted values of relevant test variable (obtained from regressions against all the exogenous variables in the system) are zero.

In conclusion, it is sufficient to note that there is weak statistical evidence of endogeneity for behavioural model II. However, as discussed earlier, failure to reject the null hypothesis does not imply that there is no endogeneity present, but that it does not lead to inconsistent estimates. Thus, to improve the economic interpretation of the results, and to increase statistical efficiency, system estimation is adopted.

9.4.2 System Estimation

A system of equations can be estimated in two ways. The first accounts for contemporaneous correlations between the errors of the structural equations in the system, using seemingly unrelated regression or SUR estimation. The second accounts for simultaneities between two or more endogenous variables, which are determined jointly within the system. The methods of estimating simultaneous equations vary, depending on their treatment of information and their use of different estimators (e.g. maximum likelihood[12] versus instrumental variables). Single equation methods, like two stage least squares (2SLS) and limited information maximum likelihood (LIML), estimate the model one equation at a time whereas full-system estimators, like three stage least squares (3SLS) and full information maximum likelihood (FIML), estimate all the parameters jointly.

The choice of estimation technique in structural equation modelling is based on statistical efficiency criteria. In the presence of contemporaneous correlations, but in the absence of endogeneity, seemingly unrelated regression estimation (SUR) has an

[12] Maximum likelihood methods are invariant to reparametrisation whereas instrumental variables are not.

efficiency advantage over least squares estimation. If endogeneity is present, single equation methods, such as two stage least squares (2SLS), will have an efficiency advantage over ordinary least squares (OLS). However, single equation methods, like 2SLS, do not correct for contemporaneous correlations between the errors of structural equations in the system, as each equation is estimated in turn. If full system methods (such as FIML or 3SLS) are employed, rather than single equation methods, they are likely to have an efficiency advantage, as they correct for endogeneity and the presence of contemporaneous correlations.

Full system estimators, however, are sensitive to misspecification error. A misspecification of any one equation will, in general, lead to inconsistent estimation of all equations. To avoid this problem, when efficiency is not a crucial criterion, investigators may well prefer to employ single equation methods. The easiest and the most widely used is 2SLS, as this confines the misspecification to the particular equation in which it may appear. Finite sample bias is another problem, which may affect the coefficient estimates of full system estimators. In fact, this affects all estimators, but finite sample variation of the estimated covariance matrix is transmitted throughout the entire system, in full system estimation, implying that the finite sample variance of 3SLS may well be as large (or larger) than that of 2SLS. Thus, the advantage of full system estimation in finite samples may be more modest than the asymptotic results suggest.

Davidson and MacKinnon (1993, p.234) state that it is generally desirable for a model to be somewhat over identified[13], in order to ensure good finite sample properties for the instrumental variable (IV) estimator (of which 2SLS and 3SLS are examples). It allows the validity of the choice of instruments to be tested, to some limited extent. The greater the number of instruments included in the system estimation, the more efficient

[13] A model is identified if the order condition (which is necessary but not sufficient) and the rank condition (which is necessary and sufficient) are met. An identified equation may be either under, exactly or over identified. An equation is exactly identified if unique numerical values of the structural parameters can be obtained. It is over-identified if more than one numerical value can be obtained for some of the parameters of the structural equations. The order condition requires that the number of excluded exogenous variables should be at least as great as the number of included endogenous variables for the identification of parameters. The rank condition requires that the probability limit of the estimator should be a non-singular asymptotic covariance matrix and the matrix of parameters have full rank for asymptotic identification of the parameters by use of the optimal instruments (all exogenous and predetermined variables in the system) (see Davidson and MacKinnon, 1993).

the estimates will be. However, if estimates with as small a finite sample bias as possible are required, then fewer instruments are desirable (Phillips, 1983). According to Davidson and MacKinnon (1993, p.220), there should be as many instruments as possible if N is very large (which is not the case in this thesis). If N is large, (N>500), it is the asymptotic properties of the estimators that are the primary concern. If N is only moderately large, (N<500), as is the case in this thesis, then use of a larger number of instruments increases the risk of finite sample bias. Thus, a balanced approach is required.

Nelson and Startz (1990) found the results of IV estimation tend to be highly misleading if the instrument is a poor one (i.e. there is weak correlation between right hand side variables and the instrument). Examining the correlation matrix for the variables in this system, presented in Table 9.4, it is observed that the correlations with each of the endogenous variables and potential instruments are not high but some of the correlations are above 0.25 which is statistically significant at the 5% level e.g. S_t and $Mriv_t$. There are a number of instruments in each system, as all the equations are over identified. Specifically, there are eleven over identifying restrictions in testing behavioural model I, and thirteen over identifying restrictions in testing behavioural model II (see Table 9.5). Thus, the validity of the choice of instruments has undergone some degree of testing.

Table 9.4: Correlation Matrix

Variable	S_t	P_t	LP_{st}	$Mriv_t$	Msh_t	$Diff_t$	D_t
P_t	-0.2107	1					
LP_{st}	-0.2511	-0.133	1				
$Mriv_t$	0.7581	-0.2094	-0.1286	1			
Msh_t	-0.107	0.1034	-0.0336	-0.1807	1		
$Diff_t$	0.0912	0.105	-0.1177	0.0062	0.0359	1	
D_t	0.3245	-0.2076	-0.083	0.2204	-0.1759	0.3024	1
C_t	-0.0537	0.2744	-0.1093	-0.2183	0.2379	0.3708	0.2103
OC_t	0.3824	-0.0449	-0.1407	0.1724	-0.1703	0.0525	0.228
T_t	0.1702	0.3674	-0.0173	0.0753	-0.0378	-0.0043	0.0023
M_t	0.3012	0.0771	0.0033	0.094	-0.2941	0.1826	0.1683
Age	-0.0333	0.059	-0.1693	-0.0114	0.3751	-0.0994	-0.1649
Age2	-0.0653	0.1199	-0.1382	-0.0357	0.3153	-0.0945	-0.1477

Variable	C_t	OC_t	T_t	M_t	Age_t
OC_t	0.0456	1			
T_t	-0.0716	0.1305	1		
M_t	0.1336	0.335	-0.0345	1	
Age	-0.069	-0.2283	-0.035	-0.2354	1
Age2	-0.0711	-0.2426	-0.0153	-0.2365	0.9503

Note: Absolute values greater than 0.25 are significant at the 0.05 level.

Table 9.5: Over-identifying Restrictions

Behavioural Model	Equations	Excluded Exogenous	Included Endogenous	Over-identifying Restrictions	
				By EQN	Σ
I	**9.7**	4	2	2	11
	9.8	6	2	4	
	9.9	7	2	5	
II	**9.10**	4	2	2	13
	9.11	6	1	5	
	9.12	7	1	6	

In the presence of endogeneity, 3SLS, a full system estimator, is likely to have an efficiency advantage over the single equation methods, such as 2SLS. The results of iterative 3SLS converge, in the limit, to those of FIML estimation for all parameters. They are not only asymptotically equivalent (and asymptotically efficient) compared to the results of FIML but should be numerically equivalent (although this can be masked by cumulative errors after high iterations). The error terms in a FIML estimation are assumed to be normally distributed, homoskedastic, and serially independent. In the

presence of heteroscedasticity, of unknown form, H3SLS (and HI3SLS), also referred to as GMM (Generalised Moments Method estimation), should be more efficient than 3SLS (and I3SLS) or FIML [Davidson and MacKinnon, 1993, p.661]. Heteroscedasticity is present in size equation $S=h(.)$.[14] Given the presence of heteroscedasticity, and the sensitivity of FIML to finite sample bias in small samples, GMM estimates (or HI3SLS/H3SLS estimates in Table 9.7[15]) are presented rather than FIML estimates.[16]

The results of the several system estimation techniques are presented in Section 9.5 for each behavioural model. The estimates of ordinary least squares, seemingly unrelated regressions, two stage least squares, three stages least squares, iterative three stage least squares and generalised moments method (or HI3SLS/H3SLS) are presented for comparative purposes. Each technique has an efficiency advantage under certain circumstances, as each places different restrictions on the data and have specific merits, which may overcome the failings of other techniques, particularly in smaller samples. Table 9.6 summarises the merits or otherwise of different system estimation techniques discussed above. Efficiency is not the overriding concern here; the limitation of finite sample bias is also a concern.

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[14]No evidence of heteroskedasticity using Breusch-Pagan test for heteroskedasticity [$\chi^2_{(1)}$ = 0. 05 Prob. > $\chi^2_{(1)}$ = 0.8153] or misspecification using Ramsey RESET test [F(3, 52) = 0.40 Prob. > F = 0.7521] was found for the performance equation $P=f(.)$. There was strong evidence of heteroskedsaticity for the size equation $S=h(.)$; Breusch-Pagan test for Heteroskedasticity [$\chi^2_{(1)}$ = 64.26 Prob > $\chi^2_{(1)}$ = 0.000] and but no evidence of misspecification Ramsey RESET test [F(3, 54) = 1.8 Prob > F = 0.1969]. There was weak evidence of heteroskedasticity but no evidence of misspecification for the market extent equation $M=g(.)$; Breusch-Pagan test for Heteroskedasticity [$\chi^2_{(1)}$ = 2.88 Prob > $\chi^2_{(1)}$ = 0.0894] and Ramsey RESET test [F(3, 55) = 1.7 Prob > F = 0.1787]. No evidence of heteroskedasticity using Breusch-Pagan test for Heteroskedasticity [$\chi^2_{(1)}$ = 0. 03 Prob. > $\chi^2_{(1)}$ = 0.81655] or misspecification using Ramsey RESET test [F(3, 56) = 0.55 Prob. > F = 0.6499] for $C=j(.)$.

[15] In Table 9.7 the GMM estimates are based on the starting values of the 3SLS estimates rather than the I3SLS as the coefficient on LP_{st} in the I3SLS estimation is –1.4E-08 which is not recognised as a starting value in Shazam. The coefficients are the same as those on the 3SLS but the standard errors have been corrected using Whites HCCME estimator of the variance covariance matrix to correct for heteroscedasticity.

[16] The results of FIML estimations of the two behavioural relations provided numerically similar estimates to I3SLS estimates but the associated standard errors were very large. Thus the results were severely affected by finite sample bias. No efficiency advantage was obtained from adopting this technique.

Table 9.6: Evaluation of System Estimation Techniques

Factors	OLS	SUR/ ISUR	LIML	2SLS	3SLS I3SLS	GMM	FIML
Invariant to Reparameterisation			√				√
Corrects for Heteroskedasticity	√					√	
Corrects for Contemporaneous Correlation		√			√	√	√
Corrects for Endogeneity			√	√	√	√	√
Better finite Sample Properties			√				
Economical				√			
Less Sensitive to Misspecification	√		√	√			
Greater Efficiency if no Endogeneity	√	√					
Sensitive to Normality		√					

9.5. Results

The results of system estimation and the relevant elasticities are reported in Tables 9.7 to 9.10 below. The estimates of each behavioural model are discussed in Subsection 9.5.1. The robustness of the results across estimation techniques and behavioural models is discussed in Subsection 9.5.2. Finally, in Subsection 9.5.3 the patterns of adjustment of size, performance and the other jointly determined variables within the simultaneous system (C_t and M_t) are also examined to explore the central hypothesis that small firms tend to stay small.

9.5.1 The Estimates

The estimates of each behavioural model are discussed in turn below, beginning with behavioural model I. Sources of endogeneity within each system are discussed initially and then the results for the exogenous variables in each system are interpreted.

Behavioural Model I

The results of behavioural model I, relating size, extent of main market, and performance, are reported in Table 9.7. The three equations are set out under each other with the performance on top, size in the middle and the market extent equation at the bottom. Coefficients are as in equations (9.7), (9.8) and (9.9). The t-values are shown under each coefficient. The relevant elasticities are presented in Table 9.8, calculated using the results of the 2SLS estimation and H3SLS estimation (see footnote 12 above) for comparative purposes. In general, the results of the H3SLS estimates are discussed most, as these results have greater statistical efficiency and

Table 9.7: Results of System Estimation for Behavioural Model I

EQN	OLS	SUR	ISUR	2SLS	3SLS	I3SLS	GMM/H3SLS
P							
β_0	56.997	55.794	55.174	60.139	59.178	57.26	59.178
	(12.12)	(13.05)	(14.54)	(9.956)	(11.3)	(12.47)	(14.392)
$+\beta_1 S$	-0.0927	-0.1813	-0.2911	-0.0352	-0.1888	-0.3041	-0.1888
	(-1.891)	(-4.1)	(-7.854)	(-0.5664)	(-3.483)	(-7.614)	(-11.725)
$+\beta_2 T$	9.0916	9.4913	8.731	8.4426	10.235	11.155	10.235
	(3.995)	(4.489)	(4.211)	(3.755)	(4.752)	(5.017)	(4.4292)
$+\beta_3 C$	1.4607	1.2818	0.8009	1.6192	0.7698	0.3657	0.7698
	(2.974)	(2.897)	(2.166)	(3.261)	(1.754)	(0.9371)	(2.1091)
$+\beta_4 D$	-1.2564	-1.0554	-0.6363	-1.4053	-0.6954	-0.3862	-0.6954
	(-1.93)	(-1.806)	(-1.319)	(-2.144)	(-1.268)	(-0.8815)	(-1.5728)
$+\beta_5 M$	1.1844	2.0051	3.4408	-0.1334	0.8294	2.2964	0.8294
	(1.605)	(2.936)	(5.226)	(-0.0692)	(0.4733)	(1.42)	(0.5760)
$+\beta_6 A$	-0.2275	-0.1806	-0.1087	-0.2671	-0.1413	-0.0888	-0.1413
	(-1.289)	(-1.14)	(-0.8349)	(-1.545)	(-1.024)	(-0.8736)	(-1.5117)
$+\beta_7 A\hat{}2$	0.00323	0.0026	0.0016	0.0034	0.0020	0.0012	0.0020
	(1.659)	(1.507)	(1.111)	(1.804)	(1.312)	(1.083)	(1.9697)
S =							
α_0	42.844	68.487	100.96	118.66	111.1	107.77	111.1
	(2.081)	(3.618)	(6.164)	(2.838)	(2.681)	(2.591)	(2.7953)
$+\alpha_1 P$	-0.8860	-1.3437	-1.8896	-2.0856	-2.0463	-2.0453	-2.0463
	(-3.062)	(-5.046)	(-8.254)	(-3.33)	(-3.293)	(-3.275)	(-3.1732)
$+\alpha_2 T$	14.611	16.485	15.528	24.841	24.159	24.073	24.159
	(2.396)	(2.921)	(3.081)	(3.067)	(3.042)	(3.078)	(3.2367)
$+\alpha_3 LP_{st}$	-4.24E-05	-3.36E-05	-1.58E-05	-5.46E-05	-2.30E-05	-1.40E-08	-2.30E-05
	(-2.44)	(-2.151)	(-1.307)	(-2.759)	(-1.373)	(-0.0012)	(-3.0769)
$+\alpha_4 M$	4.2922	7.1327	11.088	6.5029	6.9769	8.4208	6.9769
	(2.365)	(4.236)	(7.257)	(1.106)	(1.286)	(1.775)	(1.9745)
$+\alpha_5 OC$	1.8621	1.3368	0.5193	0.8820	0.9946	0.6411	0.9946
	(1.706)	(1.363)	(0.6892)	(0.5259)	(0.6952)	(0.6623)	(1.6555)
M =							
δ_0	0.8973	-0.3277	-2.7022	3.5595	3.4313	2.9079	3.4313
	(0.7094)	(-0.2712)	(-2.293)	(1.654)	(1.601)	(1.37)	(1.7895)
$+\delta_1 S$	0.0369	0.0439	0.0522	0.0493	0.0374	0.0388	0.0374
	(3.309)	(4.171)	(5.425)	(2.143)	(1.678)	(1.733)	(1.8996)
$+\delta_2 P$	0.0240	0.0392	0.0694	-0.0176	-0.0159	-0.00890	-0.0159
	(1.315)	(2.25)	(4.07)	(-0.5425)	(-0.4917)	(-0.2783)	(-0.5555)
$+\delta_3 Mriv$	-0.0037	-0.0030	-0.0019	-0.0057	-0.0033	-0.0030	-0.0033
	(-2.094)	(-1.811)	(-1.291)	(-1.84)	(-1.117)	(-0.9949)	(-1.4800)
$+\delta_4 Msh$	-0.1636	-0.1419	-0.0907	-0.1573	-0.1296	-0.1231	-0.1296
	(-2.705)	(-2.501)	(-1.791)	(-2.548)	(-2.151)	(-2.05)	(-2.5645)

Note: The 3SLS estimates were iterated 2 times to generate the I3SLS estimates. The GMM estimates are based on the starting values of the 3SLS estimates rather than the I3SLS as the coefficient on LP_{st} in the I3SLS estimation is −1.4E-08 which is not recognised as a starting value in Shazam. The coefficients are the same as those on the 3SLS but the standard errors have been corrected using Whites HCCME estimator of the variance covariance matrix to correct for heteroscedasticity.

thus are more precise. An initial examination of estimates of equations (9.7), (9.8) and (9.9) suggest that the results are robust across estimation techniques.

The estimates indicate that a trade-off indeed exists between firm size and performance. For the H3SLS, I3SLS, 3SLS, SUR and OLS estimates, the coefficient of firm size, S_t, has a significant negative influence on performance, $P_t=f(S_t)$, $f'<0$ and the coefficient of performance, P_t, has a significant negative influence size, $S_t=h(P_t)$, $h'<0$. For the 2SLS estimates, size is not significant in determining performance, though its sign suggests a trade-off. As stated above, the H3SLS estimates are regarded as being superior, in terms of their econometric properties and thus are relied upon here.

The trade-off between size and performance suggests that there is potential benefit to performance from reducing firm size. Here, an increase in firm size, as measured by full-time equivalent employees, actually reduces the performance of the firm. These reductions in performance may be attributed to a reduction in labour productivity. This could be because there are increased costs associated with hiring more employees, with rising effort being expended in recruiting and training new staff. Thus, the small firm may face the prospect of having to sacrifice increases in profits or performance, in order to grow.

Viewed in the opposite way, the performance equation suggests that reductions in firm size, can actually lead to increases in performance. Performance may rise due to a leaner cost base (i.e. lower wage bill). Reid *et al.* (1993) suggested that the wage bill is often the principal cost driver of small firms and that tight control of this expense is a prerequisite for survival. Reid (1999) demonstrated that a reduction in the number of full-time employees raises the probability of survival rather than a reduction in the headcount of the firm. Using a simple arithmetic example, he shows how causalising the workforce (i.e. by hiring part-time employees as opposed to full-time employees) can control the wage bill without reducing employment in terms of headcount.[17] Restructuring the workforce in this manner may more readily allocate workers according to marginal productivity. Over-time small firms perhaps learn how best to optimally allocate the labour input to maximise profits. By becoming leaner in size (as measured by full-time equivalent employees), the survival and the long run prospects of the long-lived small firm are promoted.

[17] He found empirical evidence to support this for a sample of mature small firms (*c.f.* Reid, 1996) rather than for a sample of young business start-ups (*c.f.* Reid, 1999).

Other sources of efficiencies may arise from substitution of capital for labour, reduced agency costs (Reid, 1992) or a relative increase in the human capital of the remaining workforce in the firm. At the limit, however, one-man outfits will find it difficult to compete in the same league as dominant players in the market unless their product or service is very specialised (i.e. niche products). Thus, one would expect that there are diminishing gains to the exclusive pursuit of size reduction strategy. Certainly, if the goal of the entrepreneur were to raise its performance the trade-off relationship suggests that downsizing might be the principal way of achieving improvements in performance.

For the H3SLS estimates, evidence of simultaneity exists, between the extent of the main market and firm size. Size has a significant positive influence on the extent of the firm's main market, $S_t=h(M_t)$, and the extent of the firm's main market has a significant positive influence on size, $M_t=g(S_t)$. There is evidence of cumulative causations in the sense that the wider the extent of the firm's market, the bigger the size of the firm, and the greater the size of the firm, the wider the extent of its main market. This property moves in the opposite direction to the trade-off between size and performance. In this context, the trade-off between size and performance perhaps places a limit on the extent to which the firm is able to grow through entering new markets or penetrating existing markets.

There is no evidence of endogeneity between the extent of the market and performance, except perhaps through contemporaneous correlation, as the coefficients of M_t and P_t, in $P_t=f(M_t)$ and $M_t=g(P_t)$ respectively, are only significant under the SUR estimation. The positive sign on main market, M_t, in performance equation (9.7) supports Reid's (2001) conclusions that less dependence on local markets, or put another way the greater the internationality of markets for the main product, the greater the performance of the firm, other things being equal. In the market extent equation (9.9), the sign of coefficient on performance changes from positive to negative when the model explains endogeneity between M_t, P_t and S_t. This effect is not given further interpretation here, as the coefficient was not significant.

Let us turn now to examine each equation, by reference to the elasticities at the mean, as presented in Table 9.8. Beginning with performance equation (9.7), it was found that a 1% increase in firm size, S_t, leads to a 0.04% fall in performance, P_t, and

visa versa. Increases in the size of the firm reduce the performance of the mature small firm, but the impact is small. By contrast, the extent of the firm's main market, M_t, had a positive effect on firm performance, as discussed above. However, this effect was not significant and had a moderate elasticity of 0.03%. The coefficient on the firm's competitive strategy space, C_t, had positive and significant impact on performance. A 1% increase in the strategy space of the firm leads to a 0.05% increase in performance. Should a small firm be operating in an industry, which is subject to technical change, T_t, this experience has a significant positive effect on performance and its impact is quite large (elasticity is 0.13%). Thus industry level technical change seems to have an important effect in promoting the long run survival (and prospects) of the firm supporting Audretsch's (1995) findings for surviving entrants. The more liabilities, D_t, the firm is exposed to, the lower the performance of the firm, though the coefficient on this variable was not significant in the H3SLS estimation. A 1% increase in the forms of liabilities of the firm lowers performance by 0.02%. Reid (1993) shows that higher gearing has a crucial (and negative) impact on many key aspects of the firm's existence: medium term viability, growth and profitability. Excessive levels of liabilities too may be detrimental to the small firm's medium term viability. Here, the effect has a negative sign but it is not significant predictor of long run survival at the 5% level. The effect of greater exposure to external liabilities in the latter part of the firm's life is uncertain. If equity finance is a cheaper source of capital, the optimal strategy for highly geared small firms is to retire debt early in their lifecycle (Reid, 2003). However, later in its lifecycle many forms of capital could be appropriate. In Chapter 8, it was also found that the coefficient on gearing was insignificant in explaining long run survival. The effect of age, A_t, on the measure of performance was insignificant. The coefficient on age squared was significant at the 10% level using both 3HSLS and 2SLS. There is therefore a weak suggestion that as the firm gets older its performance falls, but at a decreasing rate. Performance is a convex function of age. This is a plausible result. If performance fell at an increasing rate the long run survival of these mature small firms would be fragile. A similar result was found for age in Chapter 8 (see Subsection 8.3.3.2).

Table 9.8: Elasticities at the Mean for Behavioural Model I

EQN	2SLS	H3SLS	EQN	2SLS	H3SLS	EQN	2SLS	H3SLS
P =			S=			M=		
β_0	0.893	0.8787	α_0	8.6923	8.1385	δ_0	1.5682	1.5117
$+\beta_1 S$	-0.0071	-0.0383	$+\alpha_1 P$	-10.2894	-10.0953	$+\delta_1 S$	0.2965	0.225
$+\beta_2 T$	0.1035	0.1254	$+\alpha_2 M$	1.0813	1.1601	$+\delta_2 P$	-0.523	-0.471
$+\beta_3 C$	0.1091	0.0519	$+\alpha_2 T$	1.50	1.46	$+\delta_2 Msh$	-0.276	-0.2274
$+\beta_4 D$	-0.0381	-0.0188	$+\alpha_3 LP_{St}$	-0.4539	-0.1914	$+\delta_2 Mriv$	-0.0656	-0.0383
$+\beta_5 M$	-0.0045	0.028	$+\alpha_4 OC$	0.4677	0.5274			
$+\beta_6 A$	-0.1013	-0.0536						
$+\beta_7 A\hat{}2$	0.0454	0.0267						

In the size equation (9.8), performance had the largest impact on size. A 1% increase in performance leads to as much as a 10% fall in size (measured by full-time equivalent employment). This effect is also considerable, relative to the influence of size on performance (elasticity of –0.04%). This finding demonstrates why there is a tendency for these mature small firms to reduce their headcount, and to become leaner to gain further improvements in performance. Here also, the extent of the main market has a sizeable impact on firm size, though its impact is much lower relative to the influence of performance. A 1% increase in market extent leads to a 1.2% rise in full-time equivalent employment. A small firm operating in an industry, which is subject to technical change, also experiences a significant positive impact on firm size (elasticity is 1.5%). In response to technical change in the industry, the firm grows in size. In similar vein, Audretsch (1995) found that small firms, which survived in innovative environments, exhibit higher growth rates. Greater headcount is perhaps required to respond to technical changes (i.e. the firm may need to increase the human capital of the firm etc.). The coefficient on labour productivity earlier in the life of the firm, LP_{St}, was negative and significant in the H3SLS estimation. This effect is indicative of the early lifecycle effects in labour productivity (see Subsection 5.2.5). Younger small firms generated more growth in sales per full-time equivalent employee than mature small

firms. It seems that more operationally efficient firms early in their life shed labour in later years to maintain efficiency. It had the lowest influence on size (elasticity is -0.19%). The size of the administrative organisation OC_t, had a positive but insignificant effect on the size of the firm. A 1% increase in the size of the administrative organisation of the firm raises firm size by 0.53%. This result is consistent with the discussion of Ghoshal *et al.* (2000) on administrative reorganisation. To engage in a larger number of these functional activities, a greater division of labour is required.

In the market equation (9.9), as stated above, performance had a negative and insignificant effect on the extent of the firm's main market (elasticity –0.5%). Firm size had a positive and relatively large impact on the extent of the firm's market. A 1% increase in firm size raises the internationality of the firm's market by 0.23%. This effect was significant. Both higher levels of market share and number of rivals had a negative effect on the extent of the firm's main market. The size of the elasticity of each effect was -0.23% and -0.04%, respectively. The coefficient of market share was significant. This is perhaps indicating that small firms have high market shares in localised markets or niche markets. As generic markets become more competitive (because of more rivals) entry into niche markets becomes an attractive survival strategy for the small firm.

Behavioural Model II

The results of the behavioural model relating firm size, diversity of the firm's competitive strategy, and performance are displayed in a similar manner in Table 9.9.[18] The relevant elasticities at the mean are reported in Table 9.10. This time for equations (9.10), (9.11) and (9.12), an initial examination of estimates suggests that the results are robust across the estimation techniques. These estimates again indicate a trade-off relationship exists between firm size and performance. For the HI3SLS estimates, the coefficient on firm size, S_t, has a significant and negative influence on performance, $P_t=f(S_t)$, $f'<0$ and the coefficient on performance, P_t, has a significant negative influence size, $S_t=h(P_t)$, $h'<0$. In similar vein to evidence found above, the coefficient on size, as measured by full-time equivalent employees, is not significant in determining performance for the 2SLS estimates, though its sign suggests a trade-off.

[18] This time the GMM estimates are calculated using the starting values of the I3SLS estimates and are thus referred to as HI3SLS estimates.

The interpretation of this trade-off is similar to that provided above for behavioural model I and thus it is not repeated again here.

The properties of the behavioural relation between the competitive strategy space of the firm and performance are less clear. System estimation techniques indicate that competitive strategy space, C_t, had a positive and significant impact on performance, $P_t=f(S_t,C_t)$. In equation (9.12), the coefficient on performance, P_t, turns negative in sign once simultaneity between performance and competitive strategy space is considered (suggesting a trade-off) but it is insignificant. Causality is perhaps unidirectional, i.e. $P_t=f(S_t,C_t)$ but $C_t \neq f(P_t)$. That is, the competitive strategy of the firm has a significant positive influence on performance, but its performance does not significantly influence the heterogeneity of the competitive strategy, $C_t \neq f(P_t)$. If the goal of the owner-manager were to raise performance, the model suggests the small firm may achieve it by reducing its size, and by competing strongly, using a wide variety of strategies (both price and non-price).

Table 9.9: Results of System Estimation for Behavioural Model II

EQN	OLS	SUR	ISUR	2SLS	3SLS	I3SLS	GMM/HI3SLS
P =							
β_0	56.997	54.849	52.986	53.113	52.89	54.996	54.996
	(12.12)	(13.02)	(20.1)	(8.059)	(8.938)	(10.65)	(14.822)
$+\beta_1 S$	-0.0927	-0.1477	-0.2854	-0.0047	-0.1045	-0.1754	-0.1754
	(-1.891)	(-3.347)	(-10.74)	(-0.0604)	(-1.488)	(-2.87)	(-5.2349)
$+\beta_2 T$	9.0916	9.1551	8.356	8.6902	9.6744	10.09	10.090
	(3.995)	(4.378)	(4.066)	(3.706)	(4.221)	(4.46)	(4.2035)
$+\beta_3 C$	1.4607	1.9884	2.5872	2.8866	2.6524	2.1594	2.1594
	(2.974)	(4.537)	(11.95)	(2.015)	(1.999)	(1.83)	(2.5702)
$+\beta_4 D$	-1.2564	-1.0752	-0.1995	-1.9571	-1.2475	-0.9173	-0.9173
	(-1.93)	(-1.86)	(-0.7354)	(-2.31)	(-1.673)	(-1.402)	(-1.7515)
$+\beta_5 M$	1.1844	0.9561	0.1016	0.6129	0.2589	0.1414	0.1414
	(1.605)	(1.458)	(0.3279)	(0.7171)	(0.3597)	(0.2378)	(0.3152)
$+\beta_6 A$	-0.2275	-0.1787	-0.0205	-0.2814	-0.1775	-0.1417	-0.1417
	(-1.289)	(-1.142)	(-0.2873)	(-1.536)	(-1.152)	(-1.099)	(-1.4783)
$+\beta_7 A\hat{}2$	0.0032	0.0026	0.0003	0.0038	0.0023	0.0018	0.0018
	(1.659)	(1.477)	(0.3837)	(1.874)	(1.35)	(1.204)	(1.7393)
S =							
α_0	40.127	66.671	121.55	146.71	136.45	133.08	133.08
	(1.879)	(3.331)	(8.018)	(2.758)	(2.654)	(2.71)	(3.2072)
$+\alpha_1 P$	-0.7830	-1.204	-1.9507	-2.4254	-2.2709	-2.1831	-2.1831
	(-2.635)	(-4.317)	(-9.009)	(-3.023)	(-2.9)	(-2.896)	(-3.3654)
$+\alpha_2 T$	12.658	17.224	24.552	25.869	24.34	23.049	23.049
	(2.017)	(2.892)	(3.931)	(2.742)	(2.709)	(2.738)	(3.1674)
$+\alpha_3 LP_{St}$	-3.92E-05	-3.37E-05	-8.30E-06	-5.44E-05	-2.53E-05	-1.14E-05	-0.1162E-04
	(-2.179)	(-2.027)	(-0.9421)	(-2.433)	(-1.344)	(-0.7666)	(-1.3200)
$+\alpha_4 OC$	2.7988	2.4408	0.5728	2.0858	1.7843	1.3618	1.3618
	(2.648)	(2.494)	(1.066)	(1.615)	(1.708)	(1.747)	(2.9287)
C =							
γ_0	-0.1729	-1.773	-4.0967	4.6964	6.2102	7.3857	7.3857
	(-0.0949)	(-1.019)	(-2.621)	(1.393)	(1.857)	(2.122)	(2.8140)
$+\gamma_1 P$	0.0445	0.0705	0.1201	-0.0301	-0.0452	-0.0595	-0.0595
	(1.696)	(2.813)	(5.29)	(-0.5928)	(-0.8992)	(-1.139)	(-1.5469)
$+\gamma_2 Mriv$	-0.0026	-0.0030	-0.0011	-0.0036	-0.0061	-0.0075	-0.0075
	(-1.522)	(-1.879)	(-0.9198)	(-1.951)	(-3.514)	(-4.361)	(-11.711)
$+\gamma_3 Diff$	0.8183	0.7549	0.2653	0.9014	0.7033	0.6254	0.6254
	(3.041)	(2.981)	(1.674)	(3.2)	(2.708)	(2.463)	(3.0788)

Note: The 3SLS estimates were iterated 2 times to generate the I3SLS estimates. The GMM or HI3SLS estimates are based on the starting values of the I3SLS. The coefficients are the same as those on the I3SLS but the standard errors have been corrected using Whites HCCME estimator of the variance covariance matrix to correct for heteroscedasticity.

We turn now to the impacts of the variables in the three equations *per se* as approximated by the relevant elasticities at the mean (see Table 9.10). The impacts of variables in the performance (9.10) and size (9.11) equations are only discussed in a brief way. This is because generally the size of the elasticities, the signs of the variables and their significance are remarkably similar to the results reported on in Table 9.9 for the performance and size equations of behavioural model I. Therefore, differences rather than similarities are emphasised in the analysis here. Examining the elasticities for performance equation (9.10), one finds that the relative magnitude of the elasticity of size on performance is 0.04%, as found above for equation (9.7). The relative importance of the diversity of the firm's competitive strategy, C_t, in determining performance increases. It now has the largest impact on performance. A 1% increase in the competitive strategy space of the firm increases performance by 0.15%. The t-value of the coefficient on D_t, the number of liabilities of the firm increased slightly. Other than these differences, the results of the performance equation (9.10) are largely similar to those for equation (9.7) above. In the size equation, performance had the largest impact on size as seen above. A 1% increase in performance is associated with an 11% reduction in full-time equivalent employment. The magnitude of this effect is similar to that for behavioural model I. Thus, there is a tendency for mature small firms strip out excess labour to gain further improvements in performance. In this instance, the labour input is perhaps more accurately matched to production requirements. The coefficients of labour productivity and the scope of the firm's activities increased in significance. The elasticity of the latter also increased from 0.53% to 0.72% whereas the elasticity of the former fell from –0.19% to –0.09%.

Table 9.10: Elasticities at the Mean for Behavioural Model II

EQN	2SLS	HI3SLS	EQN	2SLS	HI3SLS	EQN	2SLS	HI3SLS
P =			S =			C =		
β_0	0.7886	0.8166	α_0	10.7475	9.7491	γ_0	1.0345	1.6269
$+\beta_1$ S	-0.0009	-0.0356	$+\alpha_1$ P	-11.9657	-10.7703	$+\gamma_1$ P	-0.4459	-0.8833
$+\beta_2$ T	0.1065	0.1237	$+\alpha_2$ T	1.5642	1.3936	$+\gamma_2$ Mriv	-0.0204	-0.0432
$+\beta_3$ C	0.1946	0.1456	$+\alpha_3 LP_{St}$	-0.4519	-0.0945	$+\gamma_3$ Diff	0.4318	0.2996
$+\beta_4$ D	-0.0530	-0.0249	$+\alpha_4$ OC	1.1060	0.7221			
$+\beta_5$ M	0.0207	0.0048						
$+\beta_6$ A	-0.1067	-0.0537						
$+\beta_7$ A^2	0.0503	0.0235						

In the competitive strategy space equation [equation (9.12)] performance had a negative and insignificant effect on the heterogeneity of the firm's competitive strategy. This is not surprising as many factors, other than performance may be determining the size, or scope, of the firm's competitive strategy. Thus, it is not a major concern. Higher levels of product differentiation have a positive and significant impact on the dimensions of the competitive strategy of the firm. The size of the elasticity of this effect was 0.30 and 0.43 for the HI3SLS and the 2SLS estimation, respectively. To the extent that product heterogeneity (*Diff*$_i$) confers local monopolistic advantages on the small firm, it increases the dimensions on which the firm competes to protect these advantages. This finding supports evidence that small firms usually seek to cultivate mild forms of product differentiation, especially through customer service and delivery (Reid, 1993). However, it should be borne in mind that strongly differentiated products can only be sold in very limited niche markets, especially if they are constructed on a customer specified (i.e. bespoke) basis. The greater the competitive pressure in the market, as measured by the count of the number of rivals, the smaller the number of dimensions of competitive strategy of the mature small firm. Thus, as the market approaches a perfectly competitive market, the mature small firm competes on less

dimensions (Reid *et al.*, 1993). The size of this impact is small relative to that of the level of product differentiation (elasticity = -0.04).

In general, there is evidence of strong equilibrating forces on the small firm to reduce in size. Performance improvements are a clear driver of this. To improve performance, the small firm may need to downsize. However, size reduction also needs to be synchronized with suitable small firm strategies. Lean firms tend to survive by supplying niche or localised markets. The small firm also gains improvements in performance by cultivating highly differentiated competitive strategies. These effects seem to compound with the effect of size. The latter is illustrated more clearly through an examination of adjustment paths in Section 9.5.3 below.

9.5.2 Diagnostic Tests

Overall, the results displayed in Tables 9.7 – 9.10 are found to be broadly complementary. In general, the overall significance and individual coefficient significance of the estimates is greater using the HI3SLS (or H3SLS) estimation. Arguably, these are the most satisfactory set of estimates in terms of statistically efficiency, since I3SLS (or 3SLS) is a full system estimator and HI3SLS (or H3SLS) estimates are corrected for heteroscedasticity. The generalised R^2 measure, $\widetilde{R}^2$, which indicates the proportion of the generalised variance in Y explained by variation in the right hand variables in the system equations was over 0.7 for all system estimation techniques of each behavioural model (see Table 9.11)[19]. A likelihood ratio test of the null hypothesis, that all the slope coefficients in all equations are simultaneously equal

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[19] Single R^2 measures are not appropriate in an equation system. The R^2 from a particular equation computed could be negative since with system estimation in general it is not the case within each equation that the sum of the residuals is zero. The numerator could be larger than the denominator that is the unexplained variation can be larger than the total variation implying a negative R^2. This is because single equation systems minimises e'e and therefore maximises the R^2 in general. System estimation methods do not minimise e'e. The maximum likelihood (ML) estimator minimises the determinant of the residual cross products matrix; that is ML minimises det E'E. Hence ML does not maximise the individual equation R^2 values. Since single equation R^2 measures are flawed in the equation system context a different goodness of fit measure should be employed, $\widetilde{R}^2 = 1 - \frac{|E'E|}{|y'y|}$.

The system $\widetilde{R}^2$ reported in Shazam (1993) is defined as

$$\widetilde{R} = 1 - \left|\hat{\Sigma}\right| / \left|(Y - \bar{Y})'(Y - \bar{Y})\right|$$

where Y is an $N \times M$ matrix (N is the number of observations and M is the number of equations), $\bar{Y}$ contains the sample means and $\hat{\Sigma}$ is the variance covariance matrix.

to zero, was rejected again for all system estimation techniques of each behavioural model. The Chi-square statistic $\chi^2 = -N\left(\log\left(1-\widetilde{R}^2\right)\right)$ was greater than the value of the chi-square distribution, with degrees of freedom equal to the number of variable coefficients in the system, at an α level of 5%. Thus, the $\widetilde{R}^2$ measures are reliable. Further, a Breusch-Pagan Lagrange Multiplier test for a diagonal covariance matrix was rejected, after a comparison with the chi-square critical value with degrees of freedom equal [M(M-1)/2] where M is the number of equations in the system.[20] This confirms that equation-by-equation application of least squares estimation would be inappropriate to estimate the structural equations of the two behavioural models. Thus, it is important to take account of contemporaneous cross-equation correlation of disturbances using full system estimators such as 3SLS rather than single equation methods such as 2SLS.

Table 9.11: Diagnostic Tests

		STATISTIC				
Behavioural Model I		$\widetilde{R}^2$	**Chi-Square (16 d.f.)**	**LM test (3 d.f.)**	**Iterations**	**J Test (11 d.f.)**
Estimation	SUR	0.8276	110.74	8.5917		
	ISUR	0.9650	211.17	8.5917	2	
	3SLS	0.8795	133.31	24.769		
	I3SLS	0.9586	200.65	24.769	2	
	H3SLS				2	19.024
Critical value			26.3	6.25		19.68
Behavioural Model II		$\widetilde{R}^2$	**Chi-Square (14 d.f.)**	**LM test (3 d.f.)**	**Iterations**	**J Test (13d.f.)**
Estimation	SUR	0.7809	95.656	6.5889		
	ISUR	0.9875	276.22	6.5889	2	
	3SLS	0.7569	89.103	23.045		
	I3SLS	0.8325	112.56	23.045	2	
	HI3SLS				2	17.992
Critical value			23.68	6.25		22.36

[20] The Lagrange Multiplier statistic reported in Shazam (1993) is computed as $\lambda = N\sum_{i=2}^{M}\sum_{j=1}^{i-1} r_{ij}^{\ 2}$ where N is the number of observations, M is the number of equations and where r_{ij}^2 the squared correlation coefficient of residuals given by $r_{ij}^{\ 2} = \frac{\hat{\sigma}_{ij}^{\ 2}}{\hat{\sigma}_{ii}\hat{\sigma}_{jj}}$. Under the null hypothesis of a diagonal covariance structure the statistic has an asymptotic $\chi^2_{(M(M-1)/2)}$ distribution.

A test of the number of over identifying restrictions was conducted using Hansen's (1982) test of over identifying restrictions (or the J test). The test statistic is asymptotically distributed as a chi-square, with degrees of freedom equal to the number of over identifying restrictions. For each behavioural model, the J test for the over-identifying restrictions was smaller than the chi-square critical value, suggesting that over-identifying restrictions are consistent with the data. As the results of the system estimation seem robust, the next Subsection analyses the adjustment path of the behavioural relation between size, performance and the other endogenous variables in the system, namely market extent and the size of the competitive strategy space.

9.5.3 Adjustment Paths

A final interpretation of each behavioural model is embarked upon in this Subsection, by examining relationships between jointly determined variables in the system (e.g. for behavioural model II interrelationships between firm size, dimensions of competitive strategy space and performance). Suppose all the exogenous variables for the estimated equations in each system are assigned to their mean values. A function for performance $P=f(.)$, firm size $S=h(.)$, market extent $M=g(.)$ and competitive strategy $C=j(.)$ can be approximated. These relations are examined on a two dimensional graph. The size performance trade-off is examined initially and then adjustment paths for each behavioural model are illustrated. The stability of each relation is also examined.

Using the estimated coefficients of the GMM estimates in Tables 9.7 and 9.9 and the mean values for exogenous variables, the functions approximated for behavioural model I are as follows;

$$P_t = 68 - 0.1888S_t + 0.8294M_t \quad \textbf{(9.13)}$$

$$P_t = 69.9 - 0.1888S_t \quad \textbf{(9.13a)}$$

$$S_t = 136 - 2.0463P_t + 6.9769M_t \quad \textbf{(9.14)}$$

$$S_t = 151 - 2.0463P_t \quad \textbf{(19.14a)}$$

$$M_t = 2.83 + 0.0374S_t - 0.0159P_t \quad \textbf{(9.15)}$$

For behavioural model II they are as follows:

$$P_t = 59.938 - 0.1754S_t + 2.1594C_t \quad \textbf{(9.16)}$$

$$P_t = 69.742 - 0.1754S_t \quad \textbf{(9.16a)}$$

$$S_t = 160.668 - 2.1831P_t \quad \textbf{(9.17)}$$

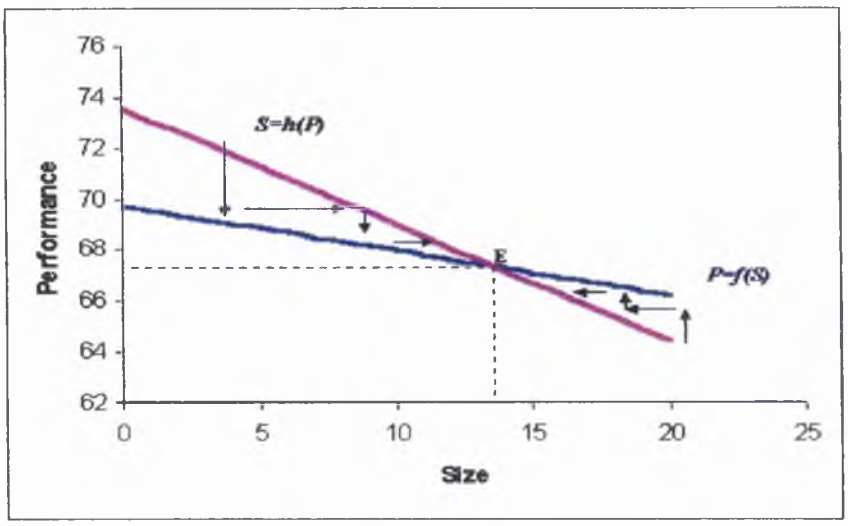
$$C_t = 8.55 - 0.0595P_t \quad \textbf{(9.18)}$$

It is informative to graph the performance and size equations. Solving out expressions (9.13a) and (9.14a) for behavioural model I, and (9.16a) and (9.17) for behavioural model II, gives the equilibrium values (S*, P*) of (13.652, 67.346) and (13.639, 67.349) respectively. These are remarkably close to the mean values for firm size, and the multidimensional measure of performance in the sample, which were 13.6508 and 67.3467. Figure 9.1 presents the case for behavioural model II. Thus equilibrium values (S*, P*) of (13.639, 67.349) denote the equilibrium point E. It should be noted, further, that the equations indicate a stable equilibrium point.[21] Thus, starting from a performance level of 69.742 on the vertical axis, a convergent path to the equilibrium point E can be traced. Similarly, starting from a size of 160 full-time

[21] This stability condition can be expressed:
$(dP/dS)_{9.13a} = -0.1888 > -0.48869 = (dP/dS)_{9.14a}$ for behavioural model I and $(dP/dS)_{9.16a} = -0.1754 > -0.45806 = (dP/dS)_{9.17}$ for behavioural model II. These stability conditions represent convergent paths to equilibrium for the behavioural models.

equivalent employees on the horizontal axis another convergent path to E can be traced. As E is close to the relevant mean size and performance values in the sample the typical mature firm in the sample may be thought of as close to this equilibrium point. The relative size of the adjustments for $S=h(P)$ is much larger than the relative magnitude of the adjustments for $P=f(S)$. In response to a desire for increases in performance, there would be a strong need for the small firm to adjust downwards in size. Therefore, to improve long run survival prospects, the small firm needs to become a leaner, more efficient operation. Performance compels the small firm to remain a small-scale operation.

Figure 9.1 Size Performance Trade-off



Turning to behavioural model I and solving out expressions (9.13), (9.14) and (9.15), one obtains equilibrium values (S*, P*, M*) of (14.7958, 67.1275, 2.32) which are similar to their levels in the sample (13.639, 67.349, 2.27). The typical mature firm in the sample is operating at a higher level of performance and a lower level of firm size. Figure 9.2 illustrate shifts in the size function, $S=h(P,M)$, leftward through equation (9.14) as a result of a one-unit reduction in the mean market extent. A new

equilibrium point E* is reached where E* represents higher values of performance and lower values of firm size. Small firms, by operating in more localised markets, achieve higher performance. The impact on firm size is considerable, these firms are much smaller in size. The strategic choice of market extent and the compelling need to reduce size to raise performance merge to produce this outcome. In essence, this figure is suggesting that the long run prospects of these small firms is promoted through exploitation of local and niche markets. However, the localisation of markets (caused by a one unit reduction in market extent) also shifts the performance function *P=f(S, M)* leftward through equation (9.13), and, mitigating the relative size of this effect, the new equilibrium is now E**. The influence of main market on performance was not significant at the 5% level, thus this result needs to be interpreted with care.

Figure 9.2 Effect of Localisation of Markets

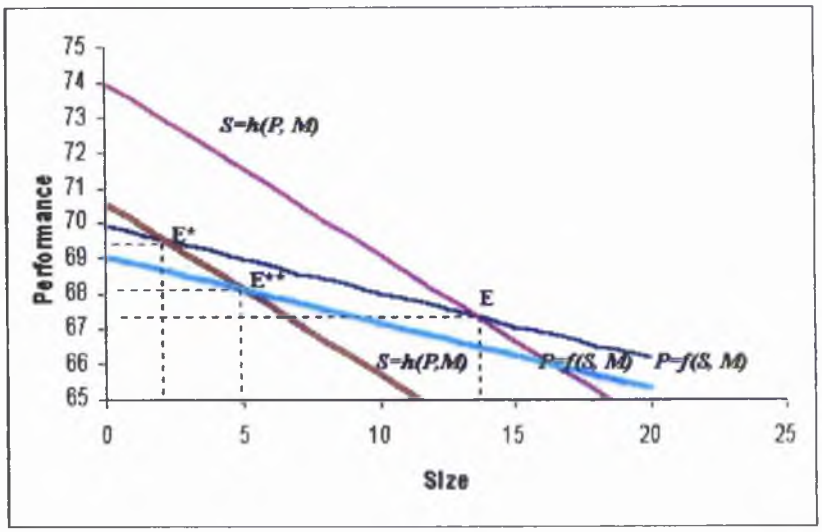
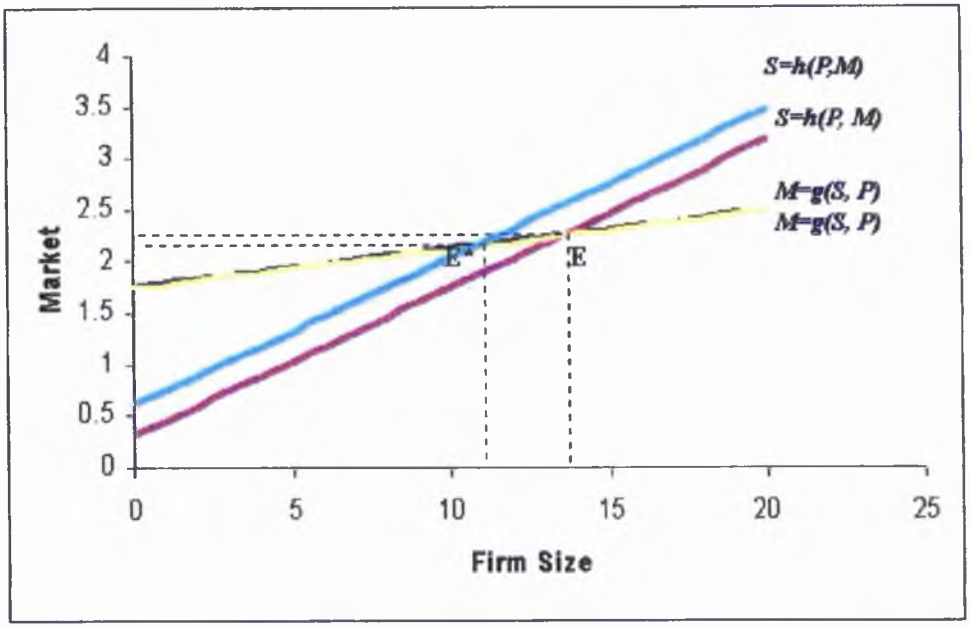
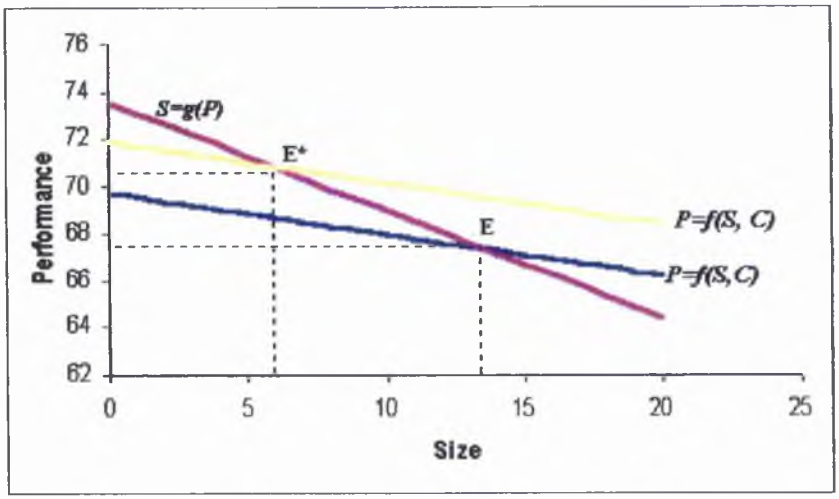


Figure 9.3: Shifts in *S=h(P,M)* and *M=g(S, P)*



According to Figure 9.3, the market extent function *M=g(S, P)* does not shift very much in response to a one-unit increase in performance, holding all other variables equal. Performance needs to increase by a significant amount (5 units) before a noticeable difference is found in the market extent equation (9.15). The size equation shifts to the left by a significant amount in response to a small change (one unit) in performance. The equilibrium size falls by a relatively large amount.

Figure 9.4 Impact of Increase in Diversity of Competitive Strategy



Solving out expressions (9.16), (9.17) and (9.18) for behavioural model II gives equilibrium values (S*, P*, C*) of (13.6196, 67.3576, 4.54). This equilibrium is very close to the respective values of average size, performance and diversity of competitive strategy in the sample of (13.639, 67.349, 4.5397). Figure 9.4 illustrates shifts in the performance function, as a result of a change in the dimensions of the competitive strategy of the firm. If the firm increases the heterogeneity of its competitive strategy, the performance function shifts to the right, and a new equilibrium point E* is reached, where E* represents higher values of performance and lower values of firm size. The magnitude of this increase in performance could be dampened, if improvements in performance feed back into the heterogeneity of the firm's competitive strategy. However, this effect was insignificant, across system estimation techniques, and thus is not given much interpretative attention here. In essence, this figure is suggesting that

the long run prospects of these small firms can be promoted through further specialisation of the dimensions by which they compete.

An examination of the adjustment paths above shows in general, that there is a strong tendency for the small firm to adjust downwards in size even for very small increases in performance. The influence of the latter is compounded with the strategic choices of the firm (e.g. the exploitation of local and niche markets). Firms, which are small in scale, are inclined to serve niche markets and to cultivate highly differentiated competitive strategy. The initiation of these strategies and the shedding of excess labour inputs raise the performance of the firm.

9.6. General Conclusions

This Chapter examines two behavioural models. The first one examines the relation between firm size, the performance and market extent. The second examines the relation between firm size, performance and size of competitive strategy space. These models are examined to explore the tendency for small firms to remain small. Novel measures of performance, size of competitive strategy space and market extent are used in exploring this hypothesis. A set of system estimation techniques was employed to estimate the behavioural models. The similarity of the results across the estimation techniques suggests the robustness of the results.

The work finds that there is a strong tendency for the small firm to remain small, on a number of fronts. First, as a trade-off exists between firm size and performance the mature small firm should act to eradicate excess labour used in the process of production. The small firm adjusts downwards in size by a considerable amount to achieve further increases in performance. A 1% increase in performance leads to as much as a 10% fall in size. This effect is also substantial relative to the influence of size on performance (elasticity of –0.04%). Performance is a strong equilibrating force to downsize. Second, to attain higher equilibrium levels of performance small firms must strive to attain a competitive advantage in a localised or niche market. The small firm can capture a larger share of such markets and can avoid direct competition with larger rivals. Third, higher performance is attainable by firms who pursue a varied competitive strategy. This can be achieved through producing customised or specialist products. It can also be accomplished through increasing the aggressiveness of its

competitive strategy, to defend market niches by raising its advertising and marketing efforts. Survival of small firms is linked to product differentiation, as typically small firms are niche players (Caplin and Nalebuff, 1986). The small firm seeks economies of scope in serving these niche markets, to improve the long run prospects of the firm. Acting in these ways, entrepreneurs can have a positive influence on the long run performance of the small firm. However, as seen above, these actions limit firm size. Thus there is a strong tendency for the small firm to remain a small-scale operation.

CHAPTER 10 SUMMARY AND CONCLUSIONS

10.1 Aims and General Findings

This thesis endeavoured to identify those factors which foster the long-run survival, or continued existence, of the small firm. Under this broad research objective, three research themes were examined. First, the long-lived small firm, its long run performance and growth were characterised. Second, the long run performance of the mature small firm was explained using new measures of flexibility and turbulence. Third, the tendency of the long-lived small firm to remain small was considered in a simultaneous equation model where size, long run performance and a third variable (viz. market extent or size of competitive strategy space) were determined endogenously.

The study was fieldwork based and involved gathering new data (both quantitative and qualitative) in face-to-face interviews with 63 owner-managers of mature small firms in Scotland. An instrument which incorporated novel ways of calibrating organisational change and performance, was designed specifically for this study. The unique body of data enabled a number of new hypotheses to be tested. Both quantitative and qualitative data were combined to create seven detailed, illustrative case studies of enterprises which had survived over a long period. This enriched the quantitative analysis of the data on long-lived small firms.

The main findings of the study were as follows:

- On average, the firms which took part in the study were 26 years old and thus were indeed long-lived. The predominant firm type was still the micro-firm (63% of the 63 long-lived small firms had between 1 and 9 FTEs). The long-lived small firm's market environment, competitive strategy (viz. motives, market positioning, innovation) and internal organisation had undergone great transition since inception.

- Too much 'trimming' (or change) by the small firm had a negative effect on its long run survival prospects. Firm-specific turbulence was found to be a convex function of performance (i.e. the rate at which firm-specific turbulence negatively impacts on performance declined as firm-specific turbulence increased). This suggests that poor performers (stagnant firms) were chopping and changing merely to survive, whereas superior performers (adaptive firms) were chopping and changing effectively, to grow on the business.

- Flexibility (e.g. as measured by *Agility* and *Speed*) raised the long run prospects of the firm. Small firms must be prepared for change, agile, or both. A longer reaction time can raise performance. Acting prudently, adopting a 'wait and see' policy before implementing organisational change, and staging adjustments to organisational change, raises the small firm's option value to withdraw or to continue to invest, depending on how circumstances unfold.

- Alertness to precipitators of change had a positive impact on performance (elasticity 0.10%). However, the evidence indicates that there are diminishing returns to entrepreneurial efforts to identify more precipitators of change. Adopting a 'wait and see' policy, prior to instigating change, can only be pursued for a limited period of time, before diminishing returns set in.

- A higher number of adjustments had a positive effect on performance suggesting that entrepreneurs should follow through on all the adjustments made following organisational change (elasticity=0.06%). However, the evidence indicates that the entrepreneur should not act impulsively. Adjustments typically involve investments which are in the nature of exercising an option. Delaying an adjustment may have beneficial consequences for the performance of the firm if it reduces uncertainty (elasticity for adjustment time =0.08%). It limits downside risks and raises the flexibility of the firm to revise its strategy.

- In general, there is evidence of a strong equilibrating force on the small firm to reduce in size. Performance improvements are a clear driver of this force. A 1% increase in performance leads to as much as a 10% fall in size (measured by full-time equivalent employment). This effect is also considerable relative to the influence of size on performance (elasticity of –0.04%). Thus the evidence is that to improve performance, small firms often need to downsize. Lean firms survive by supplying niche or localised markets. Evidence indicates that the small firm also gains improvements in performance by cultivating highly differentiated competitive strategies.

Other findings were as follows:

- In tests of Gibrat's Law over the lifecycle of the long-lived small firm, the law was refuted early in the small firms lifecycle but supported thereafter. There was a shift in the growth process after five years of trading, at least in real turnover where real turnover, grew at the market rate after this point.

- Real turnover, early in the lifecycle of the firm, and number of product groups, were found to increase the likelihood of the survival of the small firm.

- Misgivings associated with 'objective' measures of performance in a small firm context prompted the development of a new measure of performance common to all firms. This measure was based on the subjective evaluations of the owner-manager, and is a measure of the fitness of the firm to survive over the long haul. Factors which were judged to be important to the long run survival of the firm included suppliers, customer loyalty, quality, differentiation, product mix, diversification, operational efficiency and skills. Environmental forces (e.g. competition, substitutes, new entrants etc.) and financial aspects (e.g. debt, credit policy) were deemed as threats to the firm's performance. This measure was found to be multidimensional using factor analytic techniques. The dimensions corresponded to Chrisman's *et al.* (1998) view of new venture performance as a function of the entrepreneur, strategy and industry structure, resources and organisational structure.

- Family succession was only a likely end game in a fifth (21.7%) of cases. Over half (51.7%) the firms believed that a trade-sale was a likely outcome. Another fifth (20%) believed that an employee would take over the running of the business. Only a tenth (11.1%) believed that the firm would close down on the retirement of the owner-manager. Issues hampering the survival of the firm include finding a pool of buyers, asserting the value of the business enterprise, the transfer of idiosyncratic knowledge and finance.

The chief contribution of this thesis involved the collection of an original body of data on long-lived small firms, and the application of a positivist approach to the testing of novel hypotheses about performance and growth on these data. The main findings presented above are judged to make a significant contribution to the existing literature on small business economics.

10.2 Research Conclusions and Contributions

This Section summarises the key research conclusions and contributions by reference to those parts of the thesis that most embody them: Parts IV (Chapters 5-7) and V (Chapters 8-9). Essentially, the main conclusions, indicated in 10.1 above, are examined in greater detail below.

Part IV builds up a picture of the typical long-lived small firm in the sample. **Chapter 5** contributed to the literature by presenting a characterisation of the long-lived small firm and its market environment. The surviving firms were almost one generation and predominantly small in size (i.e. micro firms). These firms can remain small and survive over the long haul, supporting Agarwal and Audretsch, (1999) findings. Initial size, and not size at maturity, is associated with longevity, see Geroski (1995). Furthermore, building on an analysis by Reid (2001) Chapter 5 finds that the growth process of real turnover shifts from a stable growth process, which tends to an equilibrium value of real turnover early in the life of the firm to a semi-stable growth path where real turnover grows at the market rate (i.e. independent of firm size) after five years of trading. This analysis differs from, and extends, Reid (2001), because support for Gibrat's Law is examined over longer time intervals, and at different points in the life cycle. The behaviour of growth in real turnover over the lifecycle presents a new insight on empirical tests of Gibrat's Law. Gibrats Law is refuted early in the lifecycle of the firm and supported later in the lifecycle.

Putting this finding in perspective, it seems that is important to consider different points in the lifecycle of the firm in testing Gibrat's Law. Evidence which refutes Gibrat's Law, at least in the case of real turnover, may be capturing an early lifecycle effect. If examined later in the small firm's life, evidence to support Gibrat's Law may be found. This prescription supports Jovanovic (1982) findings, but is at odds with Evans (1987a) findings. As stated in Chapter 3, Jovanovic (1982) rejected Gibrat's Law for young firms, but suggested that firm growth rates may be independent of size among

mature firms. Evans (1987a) found no evidence of this for mature firms aged 7, 20 and 45 years.

The evidence is not as convincing for models using full-time equivalent employees and labour productivity over longer time intervals. The small firm has a greater ability to adjust FTEs and labour productivity, as opposed to turnover later in the firm's life. It is plausible that the firm adjusts headcount to maintain long run equilibrium values of labour productivity (i.e. real turnover per FTE), as long run equilibrium values of labour productivity tend to remain relatively stable over the life of the firm (between 50-60K).

Chapter 6 develops a novel measure of performance by summing owner-manager appraised ratings. These ratings are based on the perceived firm's fitness to stay in business over the long haul. The index is based on 28 distinct attributes incorporating aspects of the firm's competitive environment, financial management, organisational structure and business strategy. Owner-managers judged suppliers, customer loyalty, quality, differentiation, product mix, diversification, operational efficiency, and skills to be important to the long-run survival of the firm. This confirms findings on the influence of diversification (Ungern-Sternberg, 1990; Reid, 1993), human capital (Cressy, 1996; Bates, 1990; Erikson, 2002) and relations with customers and suppliers (Reid *et al.*, 1993) to the long run survival and growth of the firm. Owner-managers had heterogeneous views on the influence of financial (e.g. debt, credit policy) and environmental attributes (e.g. competition, substitutes, new entrants, rival's innovation, regulation) on the long-run survival of the firm. The underlying multi-dimensional nature of this long run performance indicator was confirmed using factor analytic techniques. The five dimensions extracted, namely, internal organisation, industry structure and rivalry, business strategy, resources and nature of buyers and suppliers, provide some structure and insight into the variables which the owner-manager must juggle to manage the firm. They help to corroborate Chrisman's *et al.* (1998) view of new venture performance as a function of the entrepreneur, strategy, industry structure, resources and organisational structure.

The long run performance indicator behaves in a similar manner to net profits, in that it is negatively correlated with asset growth and the level of indebtedness of the firm. The owner-manager seems to take actions which are based on his own judgment

about the long run prospects of the firm. Thus the performance measure also behaves as expected in econometric models of performance in Chapters 8 and 9. The measure allows a judgement to be made of relative performance, on a common basis, for all small firms, both in services and manufacturing. It is not subject to the weaknesses associated with using objective measures, such as asset growth and rate of profitability. The failure to value the intangible asset base of the business, and inaccuracies in self reported net profit figures (due to failure to distinguish profit from income, implied tax liability, annual variation) in the small firms' context severely affect such figures. To illustrate, difficulties in interpreting reported performance figures of the enterprise profiles (presented in Volume II, Appendix 5) clearly illustrate the problems with using objective measures like asset growth (see enterprise profiles B, E, F and G) and rate of profitability (see enterprise profiles B, C and G)

In **Chapter 7,** existing hypotheses on entrepreneurial intentions, market positioning, size of competitive strategy space, product and process innovation, internal organisation and information technology are challenged, using new data on long-lived small firms. This Chapter also presents new evidence on key organisational changes experienced by the firm over its life and on potential end-games of mature small firms on the retirement of the owner-manager.

Key organisational changes identified by the owner-manager were found to be pivotal, in that they occurred on average just eight times over the life of the firm. Thus owner-managers were very discriminating in attributing the term 'key' to organisational change. From the list of changes presented to owner-managers, a change in capacity was identified in three quarters of the cases as the most common form of organisational change. Over half of the small firms also changed their product range, cashflow, assets, location and management. Even though a change in capacity was the most common form of change, changes in product range and cashflow were jointly ranked as most important in the running of the business.

As the firm ages, intergenerational effects become important. There are signs of a change in motivation of the owner-manager of the long-lived small firm from creating a business with survival prospects to trying to raise the value of the business on a trade-sale or other end game. Traditionally, family succession was the most likely end game but only a fifth of owner-managers stated that they were passing the business on to their

offspring. This is a preferable option for the owner-manager as interests are closely aligned and idiosyncratic knowledge can be transferred over time (not in all cases though, see enterprise profile B versus A and C). Half the owner-managers were hoping to sell on the firm, yet difficulties in locating buyers willing to pay a fair price for the business were highlighted. There was a wariness about the capacity for opportunistic behaviour on the part of rivals (potential buyers) etc. Another fifth wished to transfer the business to an employee, but expressed difficulties in locating suitable and competent successors who had both access to finance and the capacity to bear the risk of running the business. Despite such difficulties, enterprise profile D is an excellent example of a successful transfer of ownership using this end game. It was only in a tenth of cases that owner-managers believed that their business would close down upon their retiring, which is comforting news for policy makers. It would be interesting to re-interview these firms in another ten years to investigate which end game was finally adopted.

Part V explores two novel hypotheses in econometric terms. **Chapter 8** contributes to the literature by considering the relationship between small firm flexibility and the long run prospects of the small firm. The theoretical development of the concept of flexibility in the literature has not yet been followed by its empirical development, see Carlsson (1989). This Chapter aims to remedy this omission in the literature. The long run performance indicator is explained in terms of firm-specific turbulence (i.e. count of key organisational change experienced by the small firm) and new measures of flexibility (viz. *Agility* and *Speed*). Estimation of the implied performance equation uses Heckman's sample selection model. Carlsson's (1989) notion of strategic (long-term) flexibility, and Ghemawat's (1991) conception of flexibility, as the ability of the firm to revise its strategy as uncertain events unfold, were influential in the formulation of the measures of flexibility adopted in the estimation.

It was found that the flexibility measures enhanced the long run prospects of the small firm (see Table 8.6). Further, agility was found to have a positive and significant impact on performance (elasticity = 0.10). Those small firms, which are able to dampen consequential adjustments, in response to precipitators of change, are thereby able to raise the long run prospects of the firm. This suggests that the strength of such firms is

in having an internal organisational structure which is better equipped to cope with environmental change. It was found that speed (in the sense of time taken to adjust) also had a positive and significant effect on the performance of the firm, which may seem contrary to prior expectations (elasticity = 0.17). The suggested interpretation, in the face of this anomaly, is that a longer reaction time can raise performance using real options logic (Luehrman, 1997, 1998; McGrath, 1999). By acting prudently, adopting a 'wait and see' policy before implementing organisational change, and by staging investments to achieve organisational change, the firm's option value, to withdraw or to continue to invest, is raised. Holding a portfolio of options, until uncertainties are resolved, is likely to raise the performance of the firm as the firm is thereby avoiding downside risks.

The empirical relevance of the real options reasoning was tested more stringently when agility (i.e. *Precipitator, Adjust*) and speed (i.e. *PrecipitatorTime, AdjustTime*) were disaggregated into their component parts. Evidence of non-linearities was found between *Precipitator* and *PrecipitatorTime* indicating that there are diminishing returns to adopting a 'wait and see' strategy in an effort to identify precipitators of change (see Table 8.10). Alertness to precipitators of change had a positive impact on performance. Entrepreneurs should be actively scanning the environment for opportunities to improve performance, or for signs of environmental change to which the firm could be better adapted. A longer reaction time (*PrecipitatorTime*) had a positive but not significant effect on performance providing weak confirmation that adopting a 'wait and see' policy is advantageous. However the marginal effect of a higher absolute number of precipitators on performance is reduced, the longer the firm takes to initiate organisational change. That a trade-off exists, is confirmed by the negative and significant coefficient on the interaction term (*Precipitator*PrecipitatorTime)*. The entrepreneur can only hold options for a limited period, as the potential risk of late entry or of the opportunity becoming 'out of the money' is high, as the number of precipitators rise. At all times, the entrepreneur must weigh up the costs and benefits of exercising a strategic option, now or in the future, given available information. At a general level, the ability to exercise a strategic option in the future provides the entrepreneur with greater flexibility. Thus, by adopting a 'wait and see' strategy, the owner-manager can gather further information, and can wait to exercise the strategic

option when it has reach fruition (i.e. its value cost metric>1, and NPV >0 and low volatility, see Luerhman, 1998).

Evidence of non-linearities was not found between the number of consequential adjustments (*Adjust*) and the adjustment time (*AdjustTime*). Interpreting evidence from Table 8.8 it was found that a higher number of adjustments had a positive effect on performance, signalling that the firm should follow through on all the adjustments to be made following the organisational change. However, the entrepreneur should not act hastily. Delaying an adjustment may have beneficial consequences for performance, if it reduces uncertainty and diminishes irreversibility. A firm which stages adjustments to organisational change (taking a longer adjustment time) may actually raise its performance. Such an approach would hold that the entrepreneur should proceed cautiously when implementing change. He should make smaller investments initially, before instigating larger irreversible investments. Larger investments should only be made once uncertainties are resolved. This limits downside risks and raises the flexibility of the firm to revise its strategy as circumstances unfold. Put more technically, it raises the bundled value of the portfolio of options (or consequential adjustments).

Firm-specific turbulence was found to have a negative effect on performance. Too much 'trimming', or too much organisational change, reduces performance. For example, it wastes resources, and suggests false or imprudent moves, which then require correction. Firm-specific turbulence was found to be a convex function of performance. The rate at which this negative impact of firm-specific turbulence imposes its effect on performance is found to decline, as firm-specific turbulence increases. It is confirmed that both poorly performing firms (or "stagnant" firms) and highly performing firms (or "adaptive" firms) tend to be relatively active in undertaking changes, compared to moderately performing firms, see Reid and Smith (2000b). On the one hand, stagnant firms are active in making organisational changes just to survive, and on the other, adaptive firms are highly active in making organisational changes, because of a keen desire to improve performance and promote growth. It may be that a relative preponderance of these "stagnant" firms in the sample is driving the overall negative relationship observed between firm-specific turbulence and performance, with only a small proportion of small firms experiencing positive dynamics.

In the sample selection equation, two variables were found to have a positive influence on the long run survival of the small firm (see Table 8.7). These were initial start-up size (as measured by real turnover, early in the life of the firm) and number of product groups. The former finding supports earlier evidence reported on above, of the importance of initial start-up size to the longevity of small firms. Diversification was also judged by owner-managers to be important to fitness of the small firm over the long haul.

Overall, it has been found in the extant literature that proportionately few small firms enjoy high performance and growth. Storey (1996, 1997, 1998a,b) describes these few as 'ten percenters' because they are rare, and Birch (1996) describes them as 'gazelles' because of their apparently effortless higher performance. Rather than focusing on the characteristics of the rare high performers **Chapter 9** explores a new hypothesis, which is the tendency for most small firms to remain small, in terms of scale of operation, throughout their lives. Investigating whether a trade-off exists between growth and performance has received both a lot of theoretical development (Penrose, 1959; Marris, 1964; Richardson, 1964; and Slater, 1980) and extensive empirical testing (Cubbin and Leech, 1986; Dobson and Gerrard, 1989; Reid 1993, 1995, 1998; Cowling, 2004). By contrast, Chapter 9 examined whether a trade-off existed between size and performance. The joint determination of firm size, performance and other factors, which may inhibit growth in the scale of the small firm was analysed in a three-equation simultaneous model. The latter factors included the size of the market for its product (e.g. local service) and the level of differentiation of the product (e.g. extent of customisation).

Clear evidence was found of a trade-off relationship between size (measured by full-time equivalent employees) and performance (measured using the long run indicator of performance). Size was found to influence performance negatively, and performance was found to influence size negatively. Further, the impact of increases in performance on size (measured by elasticities) is much larger relative to increases in size on performance. A 1% increase in performance leads to as much as a 10% fall in size (measured by full-time equivalent employment) whereas a 1% increase in size leads to only a 0.04% fall in performance (see Table 9.9 and Table 9.11). It is therefore concluded that performance improvements are a strong equilibrating force on the small

firm, creating inexorable pressure to reduce in size. More specifically, reductions in size lead to increases in performance due to a leaner cost base and to relative increases in the human capital of the workforce, and thus to higher labour productivity.

Other jointly determined variables in the three equation models included market extent and the size of the competitive strategy space. Evidence of a simultaneous relationship was found between the extent of the main market and firm size. Size has a significant positive influence on the extent of the firm's main market, and the extent of the firm's main market has a significant positive influence size. Thus the wider the extent of the firm's market, the bigger the size of the firm; and the greater the size of the firm, the wider the extent of its main market. The impact of market extent on size (elasticity =1.16%) was much higher than the impact of size on main market (elasticity =0.225%). This property of the model has an effect whose impact is in the opposite direction to the trade-off between size and performance discussed earlier. In this context, it seems that the trade-off between size and performance places a limit on the extent to which the firm is able to grow through entering new markets or penetrating existing markets. By implication, if the entrepreneur wishes to increase his firm's performance, there is a motivation to remain small. To illustrate, Figure 9.2 has shown that the effect of entering a more local market, other things being equal, is to raise performance, and to reduce the headcount of the firm.

Only a unidirectional relationship was found between the performance, and the size of the competitive strategy space. The size of the competitive strategy space has a positive and significant affect on performance. However, performance does not have a significant influence on the heterogeneity of the competitive strategy. Rather than just becoming leaner in size, the entrepreneur can also raise the performance of the firm by increasing the size of the competitive strategy space (i.e. by further differentiating its product offering) and thereby cultivating a niche market. In fact, an increase in the size of the competitive strategy space, holding all else equal, results in a rise in performance, and a reduction in firm size (see Figure 9.4). In this sense, the pursuit of a focus differentiation strategy imposes a limitation on the growth in firm size (i.e. there is a tendency for the firm to remain small).

10.3 Further Research and Recommendations

This Section concludes this Chapter by suggesting potentially fruitful areas for further research. It also suggests recommendations to policymakers, and to business educators, concerning prescriptions that can increase the long run prospects of small firms, in appropriate contexts.

The analysis presented in **Chapter 5** could be extended by surveying the characteristics of long-lived small firms in other countries for comparative purposes. It would also be interesting to examine the behaviour of net assets over the lifecycle of the long-lived small firm, to see if they behave in a similar manner to real turnover (i.e. grow at the market rate after five years of trading). Lack of data on net assets over the lifecycle prohibited an analysis of support for Gibrat's Law at different points in the lifecycle in this study using this size measure. Further the scale measures used in testing Gibrat's Law over the lifecycle were gathered retrospectively and correspond to different life histories of firms. It would be nice to reaffirm the findings using data gathered on scale measures longitudinally over the life of the firm, for a single cohort of small firms.

Chapter 6 developed an indicator of the long run performance of the firm, which was useful for measuring the performance of a heterogeneous group of firms, as it was not related to age, organisational form or market characteristics of the firm. In the estimations of performance equations in this thesis it seems that owner-managers act on this performance measure. It would be interesting to see how this long run indicator of performance behaves in estimates of other performance equations. The results of factor analysis of the underlying determinants of this performance measure could be investigated further, by increasing the size of the sample so that more items could be included in the analysis.

In **Chapter 7** a number of issues surrounding the end game were highlighted as potentially fruitful areas for further research. An in-depth study is required of different end games (e.g. family succession, trade-sale and management/employee buyout, asset disposal) looking at the transfer of idiosyncratic knowledge, the process of passing the baton, the finance of purchase, the market for long-lived small firms and the market value of long-lived small firms (particularly those with sizeable intangible assets). The role of policy makers in counteracting market failure also needs to be explored (e.g. the

absence of pool of buyers or proper market, asymmetric information between buyers and sellers on quality of these businesses, low market valuations for these businesses because of risk of adverse selection). There perhaps is a role for policy maker, in fostering a better functioning market for these firms. For example, it could operate in a similar manner to the market for venture capital, with a better provision of intermediation services, like third party due diligence. The value of founders as advisors to prospective new managers of the firm needs to be communicated by business educators, because this is one way in which idiosyncratic knowledge can be transferred. This is particularly important in cases where the founder represents a sizeable component of the intangible asset base of the business. It may ensure that customers do not switch suppliers, and may therefore help retain the goodwill of the business, following changes in ownership. Other areas which could be investigated include financial assistance to, and management training of, employees to take over the running of long-lived small firms. In general, research into these areas may help policy makers and business educators reduce the death rate or risk of sudden exit of long-lived small firms as they approach their thirtieth year of trading.

In **Chapter 8** measures of flexibility (viz. *agility* and *speed*) were shown to enhance the long run prospects of the firm. These measures were averaged across a number of types of changes. Further research could estimate a similar model examining the influence of flexibility measures on performance for specific changes. Limits on sample size do not enable microanalysis of this nature in this thesis. In business education, more emphasis could be placed on adopting a real options approach to decision-making within the firm. Entrepreneurs can be taught to act in ways which increase the flexibility of the firm, and ultimately its performance. By adopting the guiding principles of real options analysis, the firm will perhaps not engage in as much trimming of, or meddling into, the business. According to the findings of the thesis, this will reduce the negative impact of firm-specific turbulence on firm performance.

Finally, **Chapter 9** found that there is a general tendency for the long-lived small firm to remain small. The larger proportion of small firms are not 'scaleable'. This should be recognised by business educators and policy makers. Proportionately few firms will grow to be large firms. Policies and strategies to promote longevity should not solely focus on the few 'gazelles', but should focus more on the bedrock of small

firms who tend to remain small throughout their lives. These firms serve localised and niche markets by differentiating what they offer to their market. In further research, the econometrics of the size/performance trade-off identified in Chapter 9 could be re-estimated using alternative measures of performance (like purely financial indicators) for comparison with the long run indicator of performance used here. Larger simultaneous equation systems, controlling for more sources of endogeneity could be estimated (i.e. the joint determination of market extent, size, performance and competitive strategy space etc.). This would be possible if larger scale sponsorship of work of this sort (e.g. from central government) could be obtained, to promote a larger scale analysis of what is promising to be an illuminating and powerful research methodology, in an area of considerable policy importance.

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FACTORS WHICH FOSTER THE SURVIVAL OF LONG-LIVED SMALL FIRMS

VOLUME II

by

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for the degree of
DOCTOR OF PHILOSOPHY

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31st August 2004

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APPENDIX 1: SURVEY INSTRUMENTATION

ID#

Administered Questionnaire
Factors which Foster Survival of Long-lived Firms

Interviewer:	
Date / Time of Interview:	
Respondent:	
Firm Name:	
Firm address:	
Telephone:	
Email:	
Website:	

New owner	✓ all that apply	When (mth/yr)
Trade sale	☐	
Takeover	☐	

Age:	

Preamble:
The questionnaire is divided into 5 sections which include questions on the characteristics of your business, your expectations at start-up for the size and scope of your business, changes in the running of your business, factors which fostered your survival and the level of innovation of your business. The typical way in which we shall proceed will involve my asking a question and then noting your reply. In addition there are a number of lists from which you will be asked to choose options. It is helpful to begin in a general way. This will help us to identify the main features of your business before going into detail.

May we begin with the general questions?

Section 1: The Business

1.1.1 How would you now define your *main* line of business?

_____

_____

_____

1.1.2 On this sheet, in which industrial category (categories) does your firm lie?_____
[Hand respondent list of Standard industrial Classification (SIC) codes – Show card 1.2]
[N.B. If several categories relevant, identify most important by sales]

Importance Level	SIC Code
First most important	
Second most important	
Third most important	

[Once the respondent has completed his/her reply retrieve the show card]

1.2 In a legal sense how would you define your business?

Sole trader (operating from home) ☐
Sole trader (operating from business premises) ☐
Partnership ☐
Cooperative ☐
Private company ☐
Public company ☐
Other [Please specify] ☐

_____

1.3. How many product *groups* or *ranges* do you currently produce? _____
[e.g. pens , paper; making two.]

1.4. How many products do you produce or supply for your markets? _____
[e.g. four kinds of pens, three kinds of paper; making seven in all.]

1.5.1 What are your most important product groups or ranges according to sales?
[N.B. If several categories relevant, identify most important by sales]

Importance Level	Product Group	% of sales
First most important		
Second most important		
Third most important		

1.5.2 What percentage of sales do each of these account for?
[If more than 1 product group]

1.6 How many major rivals do you have?
[If there is a change ask the respondent to provide an estimate.]

_____	**How has this changed over the life of the business?**	**Up / Down / Same**	**By how much?** _____

1.7 How many minor rivals do you have?
[If there is a change ask the respondent to provide an estimate.]

_____	**How has this changed over the life of the business?**	**Up / Down / Same**	**By how much?** _____

1.8.1 At present do you consider your main market to be:

Local	**Regional**	**Scottish**	**British**	**International?**
☐	☐	☐	☐	☐

1.8.2 Has this changed since start-up?

Yes ☐ **How?** _____
No ☐

1.9.1 In your principal market what is your market share for _____?
[Insert the respondents specified main product offering]

Under 1%	☐
1-5%	☐
6-10%	☐
11-20%	☐
21-30%	☐
31-50%	☐
Over 50%	☐
Not known	☐

1.9.2 Has this changed since start-up?

Yes ☐ **By how much?** _____
No ☐

1.10.1 How would you compare products in your main product group with those of competitors? Would you say they are:

Identical	**Similar**	**Different**	**Cannot say?**
☐	☐	☐	☐

1.10.2 Has this changed since start-up?

Yes ☐ **In what way?** _____
No ☐

1.11.1 At present do you sell products or services typically to customers at the

Low end of the market: Standard Products at Low Price	☐
Middle of the market: Medium Quality Products at a Medium Price	☐
Top end of the Market: High Quality Products at Premium Price	☐
All of the above	☐
Other? (Please specify_____)	☐

1.11.2 Has this changed since start-up?

Yes ☐ **In what way?** _____

No ☐

1.12.1 How would you describe competition in your main market?

Intense in every aspect (price, quality rivalry etc)	☐
Strong but weak in some aspects (for example absence of price competition but strong quality competition and inter-rivalry)	☐
Generally weak but strong in some aspects	☐
Generally weak in all aspects	☐

1.12.2 Has this changed since start-up?

Yes ☐ **In what way?** _____

No ☐

1.13 Do you have a capacity output which you regard as the capacity or maximum possible output?

Yes ☐ At what percentage of this maximum does your business normally operate? _____

No ☐ **Go to 1.14.1**

1.14 What were your net profits in the last trading year approximately speaking?
[Your estimate should be net of taxes and directors fees]
[i.e. If you cannot give precise figures, rough figures or 'guesstimates' will do]

_____

1.15.1 What is the approximate size of your business today in terms of total assets (book value)?

_____

1.15.2 What was the approximate size of your business today in terms of total assets (book value) at start-up?

_____

1.16.1 Do you have any debt? **[Includes bank overdraft]**

Yes ☐

No ☐ **Go to 1.18**

1.16.2 What form does this debt take? **[Tick all that apply]**

Bank overdraft	☐
Bank loan	☐
Hire purchase agreements	☐
Other (Please Specify	☐

_____

1.17 Do you have any outside equity finance?
[Cash from business angel who sunk money into your business]

Yes ☐ **What percentage of total equity is outside equity?** _____ %

No ☐

SECTION 2: EXPECTATIONS OF SCALE AND SCOPE OF FIRM

The following questions examine your expectations of the size and scope of this business at start-up.

[In the case of a trade sale ask the respondent to answer the questions with respect to when they took over the running of the business unless they have prior knowledge of the activities of the firm under its previous owners.]

2.1 What was your main aim for the business at start-up (trade-sale)? **[Tick one only]**

To provide you an alternative to unemployment	☐
To have a business to pass on to family members	☐
To create a business with survival prospects	☐
Short term profit	☐
Long term profit	☐
Growth	☐
High sales	☐
High market share	☐
High rate of return	☐
To sell on the business	☐
Other (Please specify)	☐

_____

2.2 At start-up how far did you plan ahead (in months/years) for your business?

_____ **Months/Years**

2.3 At start-up how long did you believe the life of the business would be?

_____ **Months/Years**

2.4.1 What was your vision for the business at start-up?

_____

_____

_____

_____

2.4.2 Did you set future targets for your business at start-up?
[e.g. performance targets]

Yes	☐	
No	☐	**Go to 2.5**

[Use the table provided below to insert the answers to the following questions.]

2.4.3 What future targets did you set when starting your business?
[The three most important if more than 3]

2.4.4 Did you achieve these targets?

2.4.5 Of those targets that you did achieve how long (in months) after start-up did you achieve them?

2.4.6 Of those targets that you did not achieve can you explain why not?

1.	**Future Target**		
	Achieved?	**Yes/No Encircle**	**When achieved? (months/years)**
	Why not?		

2.	**Future Target**		
	Achieved?	**Yes/No Encircle**	**When achieved? (months/years)**
	Why not?		

3.	**Future Target**		
	Achieved?	**Yes/No Encircle**	**When achieved? (months/years)**
	Why not?		

2.5.1 At start-up how many employees did you hope to have at the end of
[Use full-time equivalent employees where two half-time employees is equivalent to one full-time employee][Include the owner manager]

5 years? _____
10 years? _____

2.5.2 At start-up what did you hope your gross sales to be at the end of

5 years? _____
10 years? _____

'Suppose a mature business is one, which has reached its desired size in terms of employees and sales turnover. Please answer the questions below with this in mind.

2.6.1 Would you say that you are a mature business?

Yes ☐
No ☐ **Go to 2.7.1**

2.6.2 How old was the business when it matured?

_____ **Years**

2.6.3 How many employees did you have on maturity?

_____

2.6.4 What was your gross sales on maturity?

_____

[Use the table provided below to insert the answers to the following questions.]

2.7.1 How many employees did you actually employ
[Use full-time equivalent employees where two half-time employees is equivalent to one full-time employee][Include the owner manager]

At start-up (takeover)? _____
After 5 years? _____
After 10 years? _____
Today? _____

[i.e. If you cannot give precise figures, rough figures or 'guesstimates' will do]
[i.e. If the business has not been trading under current ownership for 5 years or 10 years write N/A]

2.7.2 What was your gross sales at the end of

1 year of trading? _____
After 5 years? _____
After 10 years? _____
Last year of trading? _____

[i.e. If you cannot give precise figures, rough figures or 'guesstimates' will do]
[i.e. If the business has not been trading under current ownership for 5 years or 10 years write N/A]

2.8.1 Did you expect to compete head on with rivals, or indirectly by entering a niche which is not occupied by rivals?

Head to head with rivals ☐
Indirectly through entering a niche market ☐

2.8.2 What form of competition is used in your principal market?

Price ☐
Quality ☐
Volume ☐
After sales service ☐
New product development ☐
Advertising ☐
Tying up suppliers ☐
Delivery ☐
Marketing ☐
Other? (Please specify) ☐

_____

2.9 Examine the following list of functions/activities performed within your business and answer the following questions:

[Hand the respondent show card 2.9]

2.9.1 Which of the following activities did your business perform in the first year of trading? **[Tick all that apply]**

2.9.2 Which of the following activities does your business perform currently? **[Tick all that apply]**

2.9.3 In cases where a change occurred how long since start-up did that change occur? **[E.g. if your business is now engaging in an additional activity or has disengaged in an activity]**

Activities	At start-up tick all that apply	Tick all that apply today	When? (months/years)
Accounting matters	☐	☐	
Training of Personnel	☐	☐	
Computer support staff	☐	☐	
Production of product/service	☐	☐	
Sales	☐	☐	
Market Research	☐	☐	
After sales service	☐	☐	
Strategic planning	☐	☐	
Innovation	☐	☐	
Legal matters	☐	☐	
Other (Please specify)	☐	☐	
Other (Please specify)	☐	☐	

[Once the respondent has completed his/her reply retrieve the show card]

2.10 Why do you continue to operate the business today? **[Tick one only]**

To provide you with employment to the end of your working life	☐
To have a business to pass on to family members	☐
To create employment in the community	☐
For long term profit	☐
For further growth	☐
For increased sales	☐
For increased market share	☐
Get a return on the business	☐
To increase the value of the business on trade sale	☐
To have a sizeable pension or nest egg on retiring	☐
Other (Please specify)	☐

_____

2.11.1 Do you believe that the business has met your hopes for it at start-up?

Yes	☐
No	☐

2.11.2 **Why?/Why not?**

_____

_____

_____

_____

Section 3: Changes

3.1.1 From your point of view what are the main changes in running the business since start-up? Could you choose from options on this sheet?

[Hand the respondent show card 3.1]

3.1.2 Please specify the age of the business (in months/years) when these changes occurred.

	Changes	Tick all that apply	Age of business (yr/mths)
(a)	**Ownership**	☐	
(b)	**Legal form**	☐	
(c)	**Technical**	☐	
(d)	**Location**	☐	
(e)	**Cashflow**	☐	
(f)	**Innovation**	☐	
(g)	**Line of business**	☐	
(h)	**Investment**	☐	
(i)	**Number of outlets**	☐	
(j)	**Market niches**	☐	
(k)	**Product range**	☐	
(l)	**Market positioning**	☐	
(m)	**Diversification**	☐	
(n)	**Assets**	☐	
(o)	**Capacity**	☐	
(p)	**Inputs**	☐	
(q)	**Management**	☐	
(r)	**Other (Specify)**	☐	
(s)	**Other (Specify)**	☐	

[Once the respondent has completed his/her reply retrieve the show card]

If more than options are ticked on show card 3.1 above then say:

3.1.3 Of the changes you identified above what are the 3 most important changes in the running of the business?

First most important	
Second most important	
Third most important	

3.2 Could you please briefly describe each of these changes?
[Insert the descriptions in the space provided below.]

Change:

(a)	**Explanation:**

Change:

(b)	**Explanation:**

Change:

(c)	**Explanation:**

I am interested in relevant factors leading up to each change and adaptations which occurred after each change. We will deal with each of the three changes in the running of your business in turn.

[Hand the respondent show card 3.3]

3.3.1 What are the prior factors for _____? **[Insert the name of the change]**

[The respondent should examine the factors on the show card and tick the prior factors that are relevant in the space provided while the interviewer writes a more detailed description of each of these.]

3.3.2 By how many months did each prior factor precede the change?

Change:

(a)	**Prior Factors**	**How long before?**

Change:

(b)	**Prior Factors**	**How long before?**

Change:

(c)	**Prior Factors**	**How long before?**

3.3.3 What are the adaptation factors for _____? **[Insert the name of the change]**

[The respondent should examine the factors on the show card and tick the adaptation factors that are relevant in the space provided while the interviewer writes a more detailed description of each of these.]

3.3.4 How long after the change (in months) did each adaptation factor occur?

Change:

(a)	**Adaptation Factors**	**How long after?**

Change:

(b)	**Adaptation Factors**	**How long after?**

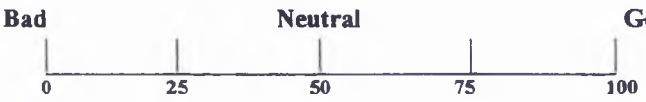
Change:

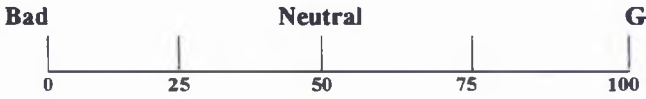
(c)	**Adaptation Factors**	**How long after?**

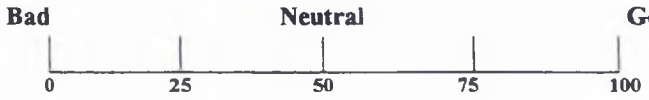
SECTION 4: FACTORS WHICH FOSTER SURVIVAL

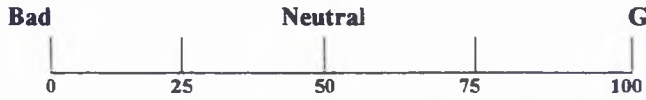
4.1 We'd like to know what has kept you in business down the years. Some things are good for business and some things are bad. What effect have the following had?

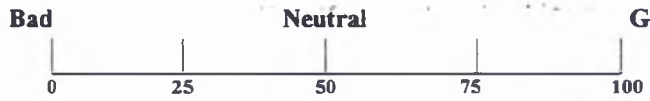
[Hand the respondent show card 4.1]
[The respondent should show with a cross whether the effect was good or bad.]

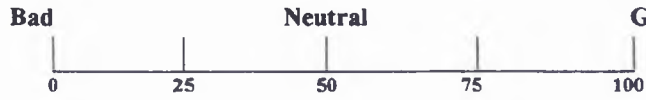
Suppliers ☐ N/A


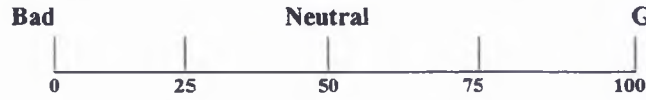
Growth ☐ N/A


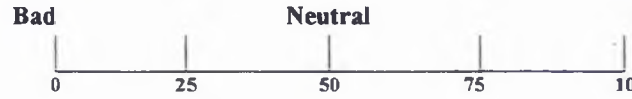
Competition ☐ N/A


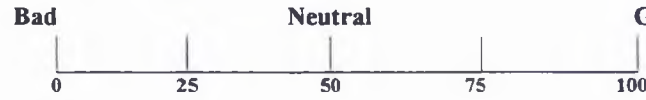
Buyer's willingness to pay ☐ N/A


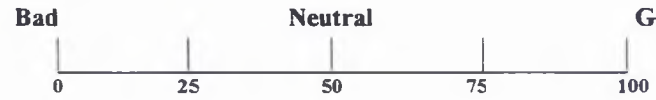
Customer loyalty ☐ N/A


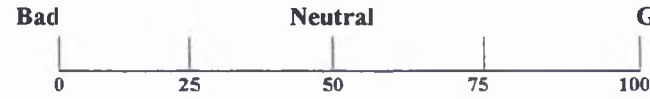
Access to buyers ☐ N/A


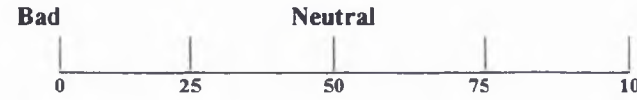
Substitutes ☐ N/A


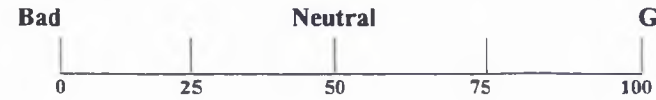
New entrants ☐ N/A


Technology ☐ N/A


Rival's Innovation ☐ N/A


Regulation ☐ N/A


Cashflow ☐ N/A


Debt ☐ N/A


Credit Policy	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Capital requirements	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Market positioning	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Location	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Cost Control	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Quality	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Market research	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Differentiation	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Advertising	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Product/Service Mix	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Diversification	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Operational efficiency	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Skills	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Monitoring	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100
Filling product gaps	N/A ☐	Bad	Neutral	Good		
		0	25	50	75	100

[Once the respondent has completed his/her reply retrieve the show card]

4.2 If you were to single out the 3 most important elements of your business strategy which fostered your survival what would they be? Please list these in order of importance.

	Most important elements of your business strategy
1.	
2.	
3.	

4.3.1 Do you expect the business to keep trading well into the future?

Yes ☐ **Go to 4.4**
No ☐

4.3.2 Why not?

_____

_____

_____

_____

_____

Go to section 5

4.4 From your point of view what exit strategy will enable the business to continue trading?

Trade sale ☐
Family member will continue running the business ☐
Management/Employee buy out ☐
Other (Specify) _____ ☐

SECTION 5: INNOVATION AND TECHNOLOGY

5.1.1 How innovative were you at start-up? **[Tick one only]**

Not at all	☐	**Go to 5.2**
A little	☐	
Quite a lot	☐	
A lot	☐	

5.1.2 What type of innovation did you mainly undertake? **[Tick one only]**
Was it based on:

Quality	☐
New products or services	☐
New technology	☐
Marketing techniques	☐
Operational efficiency	☐
Other (specify)	☐

_____

5.2 A process innovation is a new way you do things which firms already do **[e.g. how you cut a component; how you advise a client; how you overhaul an engine]** What best describes the extent of innovation in your use of processes since start-up? **[Tick one only]**

No change **[we kept all our processes the same]**	☐	**Go to 5.4**
Slight change **[we modified a few of our processes in minor ways]**	☐	
Significant change **[we modified a few of our processes in major ways]**	☐	
Important change **[we modified many of our processes in major ways]**	☐	

5.3 What best describes why you had process innovation to the extent you have just described? **[Tick only one]**

Imitation of rivals	☐
Hints from trade or professional journals	☐
Suggestions from customer	☐
Suggestions within the firm	☐
Suggestions from supplier	☐
New staff 'carrying in' knowledge	☐
Other (please specify)	☐

_____

Not applicable	☐

5.4 How much process innovation is undertaken by your principal rivals? **[Tick one only]**

None	☐
A little	☐
A lot	☐
Don't know	☐

5.5 How much competitive pressure is put on you by process innovation of your principal rivals? **[Tick one only]**

None	☐
A little	☐
A lot	☐
Don't Know	☐

5.6.1 A product innovation is a new good or service that you can sell to meet a newly discovered customer need. How many new products/services have you developed since start-up? **[Tick one only]**

None	☐	**Go to 5.7**
1-5	☐	
6-10	☐	
11-20	☐	
More than 20	☐	**Approximately how much more?**_____

5.6.2 Did you reap rewards from developing product/service innovations within your firm? **[Tick one only]**

Not as much as expected	☐	**Go to 5.6.4**
A little	☐	
A lot	☐	

5.6.3 What form did these rewards take? **[Tick one only]**

Increased market share	☐	
Increased profitability	☐	
Both of the above	☐	
Other (Please specify_____**)**	☐	**Go to 5.7**

5.6.4 Did you experience difficulties in launching new products/services onto the market? **[Tick one only]**

Yes	☐	
No	☐	**Go to 5.7**

5.6.5 What form did these difficulties take? **[Tick all that apply]**

Developing a sales strategy	☐
Getting customers to try the product	☐
Other (Please specify)	☐

_____

5.7 How much product innovation do your rivals undertake? **[Tick one only]**

None	☐
A little	☐
A lot	☐
Don't know	☐

5.8 How much competitive pressure is put on you by product innovation of your principal rivals? **[Tick one only]**

None	☐
A little	☐
A lot	☐
Don't know	☐

5.9 Are any of the following methods used to protect innovations in your industry? **[Tick all that apply]**

Patent	☐
Copyright	☐
Trademarks	☐
Exploitation of innovation rapidly [i.e. before rivals can respond]	☐
Other (Please specify)	☐

_____

5.10 Information technology refers to the devices businesses use to transmit and process general information e.g. telephone, fax, PC. What kinds of IT do you use? **[Tick all that apply]**

(a)	**Telephone**	☐
(b)	**Fax**	☐
(c)	**Telephone answering**	☐
(d)	**Electronic mail**	☐
(e)	**Telephone/video conferencing**	☐
(f)	**Cellular telephone**	☐
(g)	**Website**	☐
(h)	**Internet**	☐
(i)	**Radio communication**	☐
(j)	**Personal computers**	☐
(k)	**Electronic databases**	☐
(l)	**Other (Please specify)**	☐
	_____	
(m)	**Other (Please specify)**	☐
	_____	

5.11 How important is information technology to your business? **[Tick one only]**
Is it:

Unimportant	☐
Important	☐
Very important	☐

5.12 For which of the following do you use information technology? **[Tick all that apply]**

Networking	☐
Producing accounts	☐
Managing dealings with buyers/suppliers	☐
Monitoring performance targets	☐
Designing new products	☐
Gathering information on the activities of rivals	☐
Operational efficiency	☐
Setting targets or plans	☐
Other (Please specify)	☐

5.13 Has there been alot of technical change in your industry over the life of the business?

Yes	☐	
No	☐	**Completed**

5.14 Who have been the prime initiators of technical change? **[Tick one only]**

Acknowledged leader in the industry	☐
Newly emerging innovators in the industry	☐
Forces outside the industry [e.g. government constructed incentives]	☐
Other [e.g. please specify briefly]	☐

5.15 Which of the following statements best reflects your experience of using new technologies?
[N.B. Relate this to your experience since start-up by reference to developments like automation, robotics, numerically controlled machines] [Tick one only]

We haven't used new technologies	☐
We have implemented new technologies but rarely successfully	☐
We have implemented new technologies but not always successfully	☐
We have generally been successful in implementing new technologies	☐

This is the end of the questionnaire. Thank you for completing it. I hope you have also derived some interest yourself from doing so. Your time and cooperation are very much appreciated. Let me remind you that the strictest confidentiality will be upheld regarding the information you have provided about your business. If you should be so interested in our general findings regarding the development of small businesses we will be more than happy to share these results. We hope that our research will contribute to the success and growth of small business. We wish you all the very best with the future of your business.

Show card 1.2: SIC Classification Numbers

01	Agriculture and Horticulture
03	Forestry
11	Fishing
12	Coal Extraction and Manufacture of Solid Fuels
13	Coke Ovens
14	Extraction of Mineral Oil and Natural Gas
15	Nuclear Fuel Production
16	Production and Distribution of Electricity, Gas and Other Forms of Energy
17	Water Supply Industry
21	Extraction and Preparation of Metalliferous ores
22	Metal Manufacturing
23	Extractions of other Minerals
24	Manufacture of Non-metallic Mineral Products
25	Chemical Industry
26	Production of Man-made Fibres
31	Manufacture of Other Metals
32	Mechanical Engineering
33	Manufacture of Office Machinery and Data Processing Equipment
34	Electrical and Electronic Engineering
35	Manufacture of Motor Vehicles and Parts
36	Manufacture of Other Transport Equipment
37	Instrument Engineering
41/42	Food, Drink and Tobacco Manufacturing
43	Textile Industry
44	Manufacture of Leather Goods
45	Footwear and Clothing Industries
46	Timber and Wooden Furniture Industries
47	Manufacture of Paper and Paper Products, Printing and Publishing
48	Processing of Rubber and Plastics
49	Other Manufacturing Industries

50	Construction
61	Wholesale Distribution
62	Dealing in Scrap and Waste metals
63	Commission Agents
64/65	Retail Distribution
66	Hotels and Catering
67	Repair of Consumer Goods and Vehicles
71	Railways
72	Other Inland Transport
74	Sea Transport
75	Air Transport
76	Supporting Services to Transport
77	Miscellaneous Transport Services and Storage not Elsewhere Specified
79	Postal Services and Telecommunications
81	Banking and Finance
82	Insurance
83	Business Services
84	Renting of Movables
85	Owning and Dealing in Real Estate
91	Public Administration, National Defence and Compulsory Social Security
92	Sanitary Services
93	Education
94	Research and Development
95	Medical and Other Health Services
96	Other Services Provided to the General Public
97	Recreational Services and Other Cultural Services
98	Personal Services
99	Domestic Services

Thank you. Now please return this sheet to the interviewer.

Show card 2.9

Examine the following list of functions/activities performed within your business and answer the following questions:

2.9.1 Which of the following activities did your business perform in the first year of trading? **[Tick all that apply]**

2.9.2 Which of the following activities does your business perform currently? **[Tick all that apply]**

2.9.3 In cases where a change occurred how long since start-up did that change occur? **[E.g. if your business is now engaging in an additional activity or has disengaged in an activity]**

Activities	At start-up tick all that apply	Tick all that apply today	When? (months/years)
Accounting matters	☐	☐	
Training of Personnel	☐	☐	
Computer support staff	☐	☐	
Production of product/service	☐	☐	
Sales	☐	☐	
Market Research	☐	☐	
After sales service	☐	☐	
Strategic planning	☐	☐	
Innovation	☐	☐	
Legal matters	☐	☐	
Other (Please specify)	☐	☐	
Other (Please specify)	☐	☐	

Thank you. Now please return this sheet to the interviewer.

Show card 3.1

3.1.1 From your point of view what are the main changes in running the business since start-up? Could you choose from options on this sheet?

3.1.2 Please specify the age of the business (in months/years) when these changes occurred.

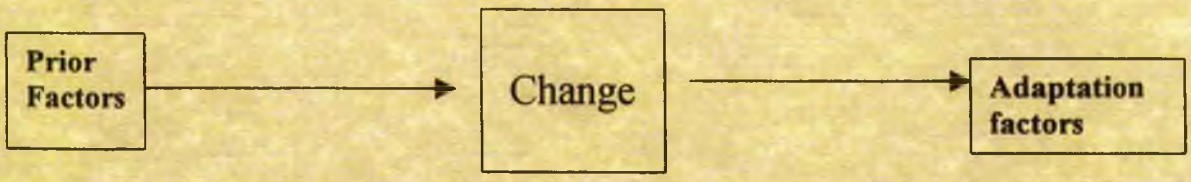
	Changes	Tick all that apply	Age of business (yr/mths)
(a)	**Ownership**	☐	
(b)	**Legal form**	☐	
(c)	**Technical**	☐	
(d)	**Location**	☐	
(e)	**Cashflow**	☐	
(f)	**Innovation**	☐	
(g)	**Line of business**	☐	
(h)	**Investment**	☐	
(i)	**Number of outlets**	☐	
(j)	**Market niches**	☐	
(k)	**Product range**	☐	
(l)	**Market positioning**	☐	
(m)	**Diversification**	☐	
(n)	**Assets**	☐	
(o)	**Capacity**	☐	
(p)	**Inputs**	☐	
(q)	**Management**	☐	
(r)	**Other (Specify)**	☐	
(s)	**Other (Specify)**	☐	

Thank you. Now please return this sheet to the interviewer.

Show card 3.3

Change:

Before **After**



[Tick the relevant prior factors and then tick the relevant adaptation factors.]

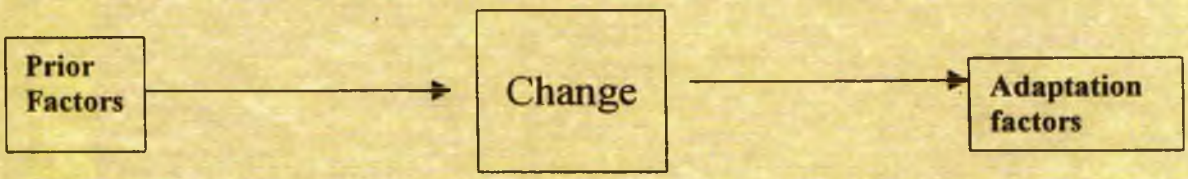
Before	*Factors*	*After*
☐	1. Growth	☐
☐	2. Demand	☐
☐	3. New niches	☐
☐	4. Tax efficiency	☐
☐	5. Credit policy	☐
☐	6. Finance	☐
☐	7. Profitability	☐
☐	8. Cost Changes	☐
☐	9. Sales	☐
☐	10. Competition	☐
☐	11. Marketing	☐
☐	12. Trade intelligence	☐
☐	13. Capacity	☐
☐	14. Access to buyers	☐
☐	15. Stock levels	☐
☐	16. Regulation	☐
☐	17. Technology	☐
☐	18. Operational Efficiency	☐
☐	19. Investment	☐
☐	20. Delinquent suppliers	☐
☐	21. Delinquent debtors	☐
☐	22. Headcount	☐
☐	23. Cost control	☐
☐	24. Skills	☐
☐	25. Mix of suppliers/customers/rivals	☐
☐	26. Monitoring	☐
☐	27. Functions of manager	☐
☐	28. Cashflow	☐
☐	29. Other (specify)	☐
☐	30. Other (specify)	☐

Thank you. Now please return this sheet to the interviewer.

Show card 3.3

Change:

Before **After**



[Tick the relevant prior factors and then tick the relevant adaptation factors.]

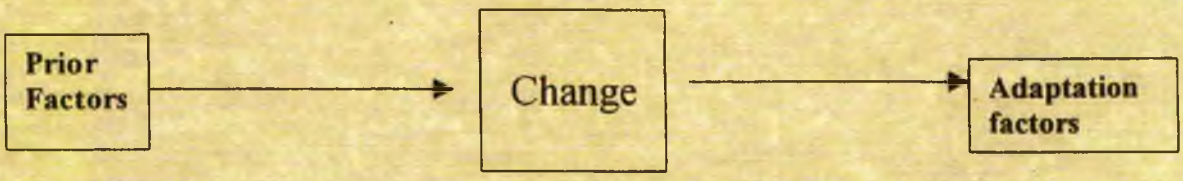
Before	*Factors*	*After*
☐	1. Growth	☐
☐	2. Demand	☐
☐	3. New niches	☐
☐	4. Tax efficiency	☐
☐	5. Credit policy	☐
☐	6. Finance	☐
☐	7. Profitability	☐
☐	8. Cost Changes	☐
☐	9. Sales	☐
☐	10. Competition	☐
☐	11. Marketing	☐
☐	12. Trade intelligence	☐
☐	13. Capacity	☐
☐	14. Access to buyers	☐
☐	15. Stock levels	☐
☐	16. Regulation	☐
☐	17. Technology	☐
☐	18. Operational Efficiency	☐
☐	19. Investment	☐
☐	20. Delinquent suppliers	☐
☐	21. Delinquent debtors	☐
☐	22. Headcount	☐
☐	23. Cost control	☐
☐	24. Skills	☐
☐	25. Mix of suppliers/customers/rivals	☐
☐	26. Monitoring	☐
☐	27. Functions of manager	☐
☐	28. Cashflow	☐
☐	29. Other (specify)	☐
☐	30. Other (specify)	☐

Thank you. Now please return this sheet to the interviewer.

Show card 3.3

Change:

Before **After**



[Tick the relevant prior factors and then tick the relevant adaptation factors.]

Before	*Factors*	*After*
☐	1. Growth	☐
☐	2. Demand	☐
☐	3. New niches	☐
☐	4. Tax efficiency	☐
☐	5. Credit policy	☐
☐	6. Finance	☐
☐	7. Profitability	☐
☐	8. Cost Changes	☐
☐	9. Sales	☐
☐	10. Competition	☐
☐	11. Marketing	☐
☐	12. Trade intelligence	☐
☐	13. Capacity	☐
☐	14. Access to buyers	☐
☐	15. Stock levels	☐
☐	16. Regulation	☐
☐	17. Technology	☐
☐	18. Operational Efficiency	☐
☐	19. Investment	☐
☐	20. Delinquent suppliers	☐
☐	21. Delinquent debtors	☐
☐	22. Headcount	☐
☐	23. Cost control	☐
☐	24. Skills	☐
☐	25. Mix of suppliers/customers/rivals	☐
☐	26. Monitoring	☐
☐	27. Functions of manager	☐
☐	28. Cashflow	☐
☐	29. Other (specify)	☐
☐	30. Other (specify)	☐

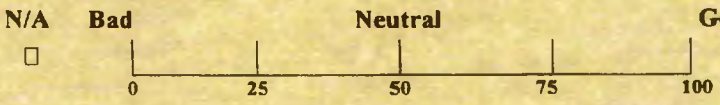
Thank you. Now please return this sheet to the interviewer.

Show card 4.1

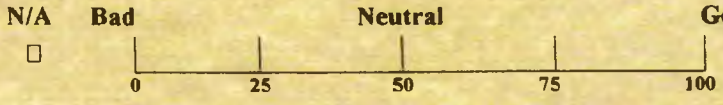
4.1 We'd like to know what has kept you in business down the years. Some things are good for business and some things are bad. What effect have the following had?

[Show with a cross whether the effect was good or bad.]

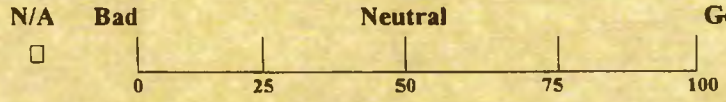
Suppliers



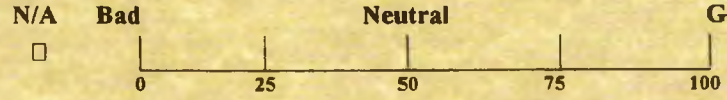
Growth



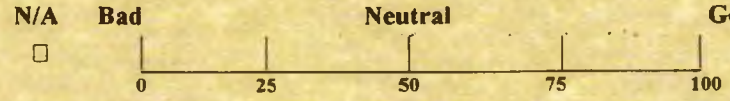
Competition



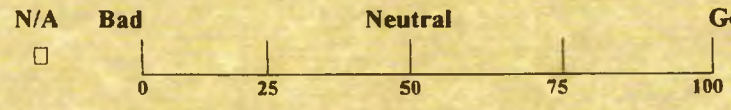
Buyer's willingness to pay



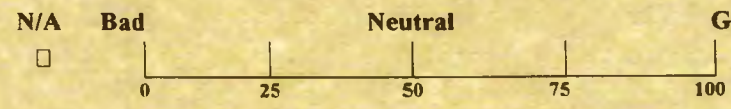
Customer loyalty



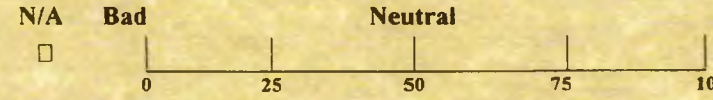
Access to buyers



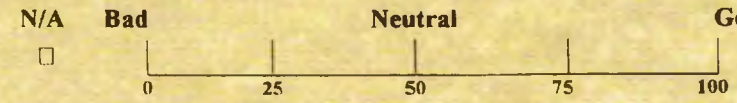
Substitutes



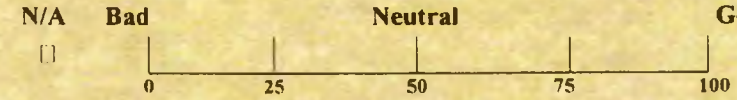
New entrants



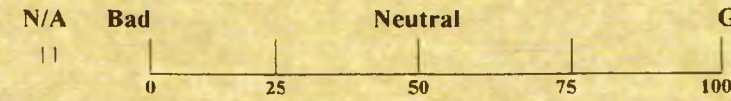
Technology



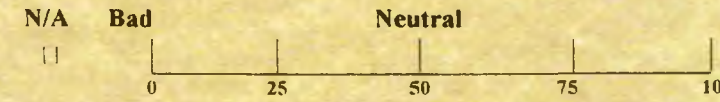
Rival's Innovation



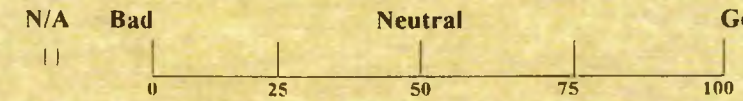
Regulation



Cashflow



Debt



Credit Policy	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Capital requirements	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Market positioning	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Location	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Cost Control	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Quality	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Market research	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Differentiation	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Advertising	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Product/Service Mix	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Diversification	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Operational efficiency	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Skills	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Monitoring	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100
Filling product gaps	N/A ☐	Bad		Neutral		Good
		0	25	50	75	100

Thank you. Now please return this sheet to the interviewer.

APPENDIX 2: CORRESPONDANCE

Type 1: Preletter Template for the Leverhulme (1994-1997)

Xth October 2001

Dear

I am a lecturer in Economics at University College Cork. I am currently an academic visitor to CRIEFF, where I am undertaking a Ph.D. on strategies for survival of long-lived small firms. I am interested in firms which have contributed to the local communities in which they operate. I am particularly concerned with those factors which have fostered the survival of your business. To date, few studies have examined the contributions of successful long-lived firms, like yours, to the Scottish economy. Your own experience is valuable and may help us to increase the survival rate of, and support for, small firms.

Eighty long-lived small firms in Scotland, such as your business, were selected for inclusion in this study. The sample was taken from an earlier study of Professor Gavin Reid. Dr. Julia Smith and Marianne Nilkes also undertook the interviews between 1994-1998. The Leverhulme Trust endorsed this study. We are interested in gathering more information on these firms, whether the business is currently under new ownership or management, or otherwise. Data gathered on the firms later in their lifecycles will add to our understanding of the dynamic nature of firm survival.

With your cooperation we would like an hour of your time to go through our questionnaire. We find that this exercise of looking at your business in a structured way can be of immediate benefit to you. It tends to generate new insights into the running of your business.

We would like to assure you that absolute confidentiality will be upheld throughout the entire study. The identity of your business will not be disclosed. When the study is completed a summary of your findings will be sent to you.

We do hope you will be willing to participate in this study. You will contacted either by me or Prof. Reid in the near future, to arrange a convenient time for this interview. Thank you in advance for your cooperation.

Yours sincerely,

Bernadette Power

Gavin C. Reid

Type 2: Preletter Template for the Leverhulme (1985-1988)

Xth October 2001

Dear

I am a lecturer in Economics at University College Cork. I am currently an academic visitor to CRIEFF, where I am undertaking a Ph.D. on strategies for survival of long-lived small firms. I am interested in firms which have contributed to the local communities in which they operate. I am particularly concerned with those factors which have fostered the survival of your business. To date, few studies have examined the contributions of successful long-lived firms, like yours, to the Scottish economy. Your own experience is valuable and may help us to increase the survival rate of, and support for, small firms.

Eighty long-lived small firms in Scotland, such as your business, were selected for inclusion in this study. The sample was taken from an earlier study of Professor Gavin Reid. He undertook the interviews with Dr. Lowell Jacobsen and Ms. Jacqueline Campbell between 1985-1988. This study was endorsed by Scottish Enterprise and Scottish Business in the Community. We are interested in gathering more information on these firms, whether the business is currently under new ownership or management, or otherwise. Data gathered on the firms later in their lifecycles will add to our understanding of the dynamic nature of firm survival.

With your cooperation we would like an hour of your time to go through our questionnaire. We find that this exercise of looking at your business in a structured way can be of immediate benefit to you. It tends to generate new insights into the running of your business.

We would like to assure you that absolute confidentiality will be upheld throughout the entire study. The identity of your business will not be disclosed. When the study is completed a summary of your findings will be sent to you.

We do hope you will be willing to participate in this study. You will contacted either by me or Prof. Reid in the near future, to arrange a convenient time for this interview. Thank you in advance for your cooperation.

Yours sincerely,

Bernadette Power

Gavin C. Reid

Type 3: Preletter Template For the Telephone Survey 1991

Xth October 2001

Dear

I am a lecturer in Economics at University College Cork. I am currently an academic visitor to CRIEFF, where I am undertaking a Ph.D. on strategies for survival of long-lived small firms. I am interested in firms which have contributed to the local communities in which they operate. I am particularly concerned with those factors which have fostered the survival of your business. To date, few studies have examined the contributions of successful long-lived firms, like yours, to the Scottish economy. Your own experience is valuable and may help us to increase the survival rate of, and support for, small firms.

Eighty long-lived small firms in Scotland, such as your business, were selected for inclusion in this study. The sample was taken from an earlier study of Professor Gavin Reid. This study was endorsed by the Federation of Small business. It concerned funding shortages in small firms. Professor Reid and Ms. Margo Andersen conducted the interviews by telephone. We are interested in gathering more information on these firms, whether the business is currently under new ownership or management, or otherwise. Data gathered on the firms later in their lifecycles will add to our understanding of the dynamic nature of firm survival.

With your cooperation we would like an hour of your time to go through our questionnaire. We find that this exercise of looking at your business in a structured way can be of immediate benefit to you. It tends to generate new insights into the running of your business.

We would like to assure you that absolute confidentiality will be upheld throughout the entire study. The identity of your business will not be disclosed. When the study is completed a summary of your findings will be sent to you.

We do hope you will be willing to participate in this study. You will contacted either by me or Prof. Reid in the near future, to arrange a convenient time for this interview. Thank you in advance for your cooperation.

Yours sincerely,

Bernadette Power

Gavin C. Reid

Type 4: Letter Of Confirmation And Respondents Agenda

Xth October 2001

Dear Mr. X

Thank you for agreeing to take participate in our study examining strategies for survival of long-lived small firms. I am writing to confirm that the interview will take place on Thursday 20th of October at 10am as we agreed over the telephone. Please find enclosed the attached agenda for this interview.

I look forward to meeting you and I hope that you will find this interview beneficial.

Yours sincerely,

_____

Bernadette Power

Factors which Foster the Survival of Long-lived Small Firms

Agenda Outline:

1. The General characteristics of your business.
2. Expectations for the size and scope of your business at start-up.
3. Changes in the running of your business.
4. Factor, which fostered your survival.
5. Innovation and Technology.

Type 5: Thank You Letter

Xth October 2001

Dear Mr. X,

I would like to thank you for the interview you gave me last Friday. The information you provided should prove to be extremely helpful as Prof. Reid and I progress in our study of long-lived small firms.

We hope that our research will contribute to the success and growth of small business. We will forward you the results of the study in April 2002. We wish you all the very best for the future of your business. Thank you once again for your cooperation.

Yours sincerely,

_____

Bernadette Power

APPENDIX 3: TELEPHONE INTERVIEWING CALLING STRATEGY

1. May I speak to Mr./Ms._____ (the owner manager) please.

2. Hello Mr./Ms. _____, I was wondering if I can speak to you for a few minutes. Are you available to speak with me at present?

Exit strategy: When would you be available to talk with me? (Agree a date and time). I will phone you back then. Thank you Mr./Ms.

3. I am a lecturer in Economics at University College Cork. I am currently an academic visitor to CRIEFF, University of St. Andrews where I am undertaking a Ph.D. on strategies for survival of long-lived small firms. I am working with Professor Reid, Director of CRIEFF within the department of Economics here at the University.

4. Have you received our letter outlining the nature of the project, which we sent to you towards the end of last week? (Yes/No)

5. Do you understand what is involved in the project? (Yes/No)

6. Would you like me to explain the project further to you? Basically we are examining strategies for survival of long-lived small firms that is small business which were classified as small at start-up and are still trading 15 years later. We are particularly concerned with those factors, which have fostered the survival of these businesses as this evidence can help new small businesses survive. We also want to increase the profile of the continued small business enterprise, as they seem to be neglected to a large extent by industrial policy. A lot of data is in existence on small business start-ups but few studies have examined the contributions of successful long-lived firms, like yours, to the Scottish economy. If there was more information available on the contribution of these firms this may increase the support for continued businesses. We have developed a questionnaire, which we would like to work through with you in the near future. It covers questions on the characteristics of your business, your expectations at start-up for the size and scope of your business, major changes in the operations and strategy of your business, factors which have fostered your survival and the level of innovation and technology of your business.

Exit strategy: When would you be available to talk with me? (Agree a date and time). I will phone you back then. Thank you Mr./ Ms.

7. Is you understanding of the aims and merits of the project clear now? (Yes/No)

8. On the basis of that could we come and interview you in the near future? (Yes/No)

If Negative - try to persuade the owner manager to take part.

9. Can we agree on a date and time now? Would you like to take a look at your diary? We will probably need an hour or so of your time? Yes/No (Arrange time)

Make sure to check schedule of interviews etc. that there are no clashes.

Exit strategy: When would be the best time for me to ring you back to arrange a time for this interview. (Agree a date/ time). Thank you Mr.

10. Either Professor Reid or I will conduct the interview however it will more than likely be me. Thank you for agreeing to participate we will send a note to confirm this and a summary agenda for the interview. We look forward to meeting you Mr./Ms._____.

Other Specific Questions:

To Address Question: How was I selected?
Eighty long-lived small firms in Scotland, such as your business, were selected for inclusion in this study. The sample was taken from an earlier study of Professor Gavin Reid. Dr. Julia Smith and Marianne Nilkes also undertook the interviews between 1994-1998. The Leverhulme Trust endorsed this study. The sample was taken from an earlier study of Professor Gavin Reid. This study was endorsed by the Federation of Small business. It concerned funding shortages in small firms. Professor Reid and Ms. Margo Andersen conducted the interviews by telephone. The sample was taken from an earlier study of Professor Gavin Reid. He undertook the interviews with Dr. Lowell Jacobsen and Ms. Jacqueline Campbell between 1985-1988. This study was endorsed by Scottish Enterprise and Scottish Business in the Community.

To Address Question: Why participate?
This provides you with the opportunity to reflect on the strategies you used over the life of the business, which may have influenced its survival. We find that this exercise of looking at your business in a structured way can be of immediate benefit to you. It tends to generate new insights into the running of your business. It is also an opportunity for you to rely your experience in running a small business. These may be a valuable tool for generating support for small business. When the study is completed a summary of your findings will be sent to you.

To Address Question: Confidentiality?
We would like to assure you that absolute confidentiality will be upheld. The identity of your business will not be disclosed.

APPENDIX 4: DATA DICTIONARY

Notes
The data dictionary contains the variables names used in the database which hold for all of the administered questionnaire data. It also shows how answers were coded for ease of analysis.

Notes to accompany the Data Dictionary

Note	
1	=0 (no), =1(yes)
2	= 01 (Agriculture and Horticulture), = 03 (Forestry), = 11 (Fishing), = 12 (Coal Extraction and Manufacture of Solid Fuels), =13 (Coke Ovens), =14 (Extraction of Mineral Oil and Natural Gas), =15 (Nuclear Fuel Production), =16 (Production and Distribution of Electricity, Gas and Other Forms of Energy), =17 (Water Supply Industry), = 21 (Extraction and Preparation of Metalliferous ores), =22 (Metal Manufacturing), =23 (Extractions of other Minerals), =24 (Manufacture of Non-metallic Mineral Products), =25 (Chemical Industry) =26 (Production of Man-made Fibres), =31 (Manufacture of Other Metals), =32 (Mechanical Engineering), =33 (Manufacture of Office Machinery and Data Processing Equipment), =34 (Electrical and Electronic Engineering), =35 (Manufacture of Motor Vehicles and Parts), =36 (Manufacture of Other Transport Equipment), =37 (Instrument Engineering), =41/42 (Food, Drink and Tobacco Manufacturing), =43 (Textile Industry), =44 (Manufacture of Leather Goods), =45 (Footwear and Clothing Industries), =46 (Timber and Wooden Furniture Industries), =47 (Manufacture of Paper and Paper Products, Printing and Publishing), =48 (Processing of Rubber and Plastics), =49 (Other Manufacturing Industries), =50 (Construction), =61 (Wholesale Distribution), =62 (Dealing in Scrap and Waste metals), =63 (Commission Agents), =64/65 (Retail Distribution), =66 (Hotels and Catering), =67(Repair of Consumer Goods and Vehicles), =71 (Railways), =72 (Other Inland Transport), =74 (Sea Transport), =75 (Air Transport), =76 (Supporting Services to Transport), =77 (Miscellaneous Transport Services and Storage not Elsewhere Specified), =79 (Postal Services and Telecommunications), =81(Banking and Finance), =82 (Insurance), =83 (Business Services), =84 (Renting of Movables), =85 (Owning and Dealing in Real Estate), =91(Public Administration, National Defence and Compulsory Social Security), =92 (Sanitary Services), =93 (Education), =94 (Research and Development), =95 (Medical and Other Health Services), =96 (Other Services Provided to the General Public), =97 (Recreational Services and Other Cultural Services), =98 (Personal Services), =99 (Domestic Services)
3	=1(Sole trader operating from home), =2 (Sole trader operating from business premises), =3 (Partnership), =4 (Cooperative), =5 (Private

company), =6 (Public company), =7 (Other)

4 =1(up), =2 (Down), =3 (Same)

5 =1 (Local), =2 (Regional), =3 (Scottish), =4 (British), =5 (International)

6 =1 (Under 1%), =2 (1-5%), =3 (6-10%), =4 (11-20%), =5 (21-30%), =6 (31-50%), =7 (Over 50%), =8 (Not known)

7 =1 (Identical), =2 (Similar), =3 (Different), =4 (Cannot say)

8 =1(Low end of the market), =2 (Middle of the market), =3 (Top end of the Market), =4 (All of the above), = 5 (Other)

9 =1 (Intense in every aspect), =2 (Strong but weak in some aspects), =3 (Generally weak but strong in some aspects), =4 (Generally weak in all aspects)

10 =1 (Bank overdraft), =2 (Bank loan), =3 (Hire purchase agreement), =4 (Other)

11 =1 (To provide you an alternative to unemployment), =2 (To have a business to pass on to family members), =3 (To create a business with survival prospects), =4 (Short term profit), =5 (Long term profit), =6 (Growth), =7 (High sales), =8 (High market share), =9 (High rate of return), =10 (To sell on the business), =11 (Other)

12 =1 (Head to head), =2 (Niche)

13 =1 (To provide you with employment to the end of your working life), =2 (To have a business to pass on to family members), =3 (To create employment in the community), =4 (For long term profit), =5 (For further growth), =6 (For increased sales), =7 (For increased market share), =8 (Get a return on the business), =9 (To increase the value of the business on trade sale), =10 (To have a sizeable pension or nest egg on retiring), =11 (Other)

14 =1 (trade sale), =2 (Family member will continue running the business), =3 (Management/Employee buy out), =4 (Other)

15 =1 (Not at all), =2 (A little), =3 (Quite a lot), =4 (A lot)

16 =1 (Quality), =2 (New products or services), =3 (New technology), =4 (Marketing techniques), =5(Operational efficiency), =6(Other)

17 =1 (No change [we kept all our processes the same]), =2 (Slight change [we modified a few of our processes in minor ways]), =3 (Significant change [we

modified a few of our processes in major ways]), =4 (Important change [we modified many of our processes in major ways])

18 =1 (Imitation of rivals), =2 (Hints from trade or professional journals), =3 (Suggestions from customer), =4 (Suggestions within the firm), =5 (Suggestions from supplier), =(New staff 'carrying in' knowledge), =6 (Other), =7 (Not applicable)

19 =1 (None), =2 (A little), =3 (A lot), =4 (Don't know)

20 =1 (None), =2 (1-5), =3 (6-10), =4 (11-20), =5 (More than 20)

21 =1 (Not as much as expected), =2 (A little), =3 (A lot)

22 =1 (Increased market share), =2 (Increased profitability), =3 (Both of the above), =4 (Other)

23 =1 (Developing a sales strategy), =2 (Getting customers to try the product), =3 (Other)

24 =1 (Unimportant), =2 (Important), =3(Very important)

25 =1 (Acknowledged leader in the industry), =2 (Newly emerging innovators in the industry), =3(Forces outside the industry [e.g. government constructed incentives]), =4 (Other)

26 =1 (We haven't used new technologies), =2 (We have implemented new technologies but rarely successfully), =3 (We have implemented new technologies but not always successfully), =4 (We have generally been successful in implementing new technologies)

VARIABLE NAME	VARIABLE	NOTE
ID	IDENTIFICATION NUMBER	
TRADSAL	TRADE SALE	1
DATETRSA	DATE of TRADE SALE (MONTH/YEAR)	
TAKEOVER	TAKEOVER	1
DATETAKO	DATE of TAKEOVER (MONTH/YEAR)	
AGE	AGE	
LINE	MAIN LINE OF BUSINESS	
FMSIC	FIRST MOST IMPORTANT STANDARD INDUSTRIAL CLASSIFICATION	2
SMSIC	SECOND MOST IMPORTANT STANDARD INDUSTRIAL CLASSIFICATION	2
TMSIC	THIRD MOST IMPORTANT STANDARD INDUSTRIAL CLASSIFICATION	2
LEGAL	LEGAL STATUS	3
OLEGAL	OTHER LEGAL STATUS	
PGROUP	NUMBER OF PRODUCT GROUPS	
PRODUCTS	NUMBER OF PRODUCTS	
FPGROUP	FIRST MOST IMPORTANT PRODUCT GROUP	
SPGROUP	SECOND MOST IMPORTANT PRODUCT GROUP	
TPGROUP	THIRD MOST IMPORTANT PRODUCT GROUP	
PFPGROUP	% OF SALES OF FIRST MOST IMPORTANT PRODUCT GROUP	
PSPGROUP	% OF SALES OF SECOND MOST IMPORTANT PRODUCT GROUP	
PTPGROUP	% OF SALES OF THIRD MOST IMPORTANT PRODUCT GROUP	
MRIVALS	NUMBER OF MAJOR RIVALS	
CMRIVALS	CHANGE IN NUMBER OF MAJOR RIVALS	4
PCMRIVAL	PERCENTAGE CHANGE IN NUMBER OF MAJOR RIVALS	
MINRIV	NUMBER OF MINOR RIVALS	
CMINRIV	CHANGE IN NUMBER OF MINOR RIVALS	4
PCMINRIV	PERCENTAGE CHANGE IN NUMBER OF MINOR RIVALS	
MARKET	MAIN MARKET	5
CMARKET	CHANGE IN MAIN MARKET	1
HCMARKET	MAIN MARKET AT START-UP	5
MSHARE	MARKET SHARE	6
CMSHARE	CHANGE MARKET SHARE	1
HCMSHARE	MARKET SHARE AT START-UP	6
DIFPROD	LEVEL OF DIFFERENTIATION	7
CDIFPROD	CHANGE IB LEVEL OF DIFFERENTIATION	1
HCDIFPD	LEVEL OF DIFFERENTIATION AT START-UP	7
MPOSIT	MARKET POSITIONING	8
OPOSIT	OTHER MARKET POSITIONING	
CMPOSIT	CHANGE IN MARKET POSITIONING	1
HCMPOSIT	MARKET POSITIONING AT START-UP	8
DESCOMP	DESCRIPTION OF COMPETITION	9
CDESCOMP	CHANGE IN COMPETITION	1
HCDESCOM	DESCRIPTION OF COMPETITION AT START-UP	9
CAPACITY	CAPACITY OUTPUT	1
OPERCAP	CAPACITY NORMALLY OPERATE	
NPROFIT	NET PROFIT 2000 NET OF TAXES AND DIRECTORS RUMUNERATION	
TOASSET	ASSETS 2001	
STASSET	ASSETS AT START-UP	

DEBT	DEBT	1
BANKOVER	BANK OVERDRAFT	1
BANKLOAN	BANK LOAN	1
HPURCH	HIGHER PURCHASE	1
0FDEBT	OTHER FORM OF DEBT	1
SOFDEBT	SEPCIFY OTHER FORM OF DEBT	
EQUITYF	EQUITY FINANCE	1
PEQUITYF	PERCENTAGE OUTSIDE EQUITY	
MAINAIM	MAIN AIM	11
OMAINAIM	OTHER MAIN AIM	
PLANHEAD	PLAN AHEAD (MONTHS/YEARS)	
LIFEBUS	LIFE OF BUSINESS (MONTHS/YEARS)	
FEEMPLOY	5 YEAR EXPECT HEADCOUNT	
TEEMPLOY	10 YEAR EXPECT HEADCOUNT	
FEGSALES	5 YEAR EXPECT GROSS SALES	
TEGSALES	10 YEAR EXPECT GROSS SALES	
MBUSIN	MATURE BUSINESS	1
AGEMAT	AGE AT MATURITY	
NEMPMAT	NUMBER OF EMPLOYEES AT MATURITY	
GSALEMAT	GROSS SALES AT MATURITY	
AEMPST	ACTUAL EMPLOYEES AT START-UP	
AEMP5YR	ACTUAL EMPLOYEES AFTER 5 YEARS	
AEMP10YR	ACTUAL EMPLOYEES AFTER 10 YEARS	
AEMPTO	ACTUAL EMPLOYEES TODAY	
ASALE1YR	ACTUAL GROSS SALES AFTER 1 YEAR	
ASALE5YR	ACTUAL GROSS SALES AFTER 5 YEARS	
ASAL10YR	ACTUAL GROSS SALES AFTER 10 YEARS	
ASALTOD	ACTUAL GROSS SALES TODAY	
EXPCOM	EXPECTED	12
CPRICE	PRICE	1
CQUALITY	QUALITY	1
CVOLUME	VOULME	1
CAFTSALE	AFTER SALES SERVICE	1
CNPD	NEW PRODUCT DEVELOPMENT	1
CADVERT	ADVERTISING	1
CTYESUP	TYING UP SUPPLIERS	1
SDELIVE	DELIVERY	1
CMARK	MARKETING	1
COTHER	OTHER FORM OF COMPETITION	1
SCOTHER	SPECIFY OTHER FORM OF COMPETITION	
STACC	START-UP: ACCOUNTING MATTERS	1
STTRAIN	START-UP: TRAINING OF PERSONNEL	1
STCOMPSW	START-UP: COMPUTER SUPPORT STAFF	1
STPROD	START-UP: PRODUCTION OF PRODUCT/SERVICE	1
STSALES	START-UP: SALES	1
STMKTRES	START-UP: MARKET RESEARCH	1
STASALE	START-UP: AFTER SALES SERVICE	1
STRATPLA	START-UP: STRATEGIC PLANNING	1
STINNOV	START-UP: INNOVATION	1
STLEGAL	START-UP: LEGAL MATTERS	1
STOTHER	START-UP: OTHER	1
SPOTHER	SPECIFY OTHER	
STOTHER2	START-UP: OTHER2	1

SPOTHER2	SPECIFY OTHER2	
TACC	TODAY: ACCOUNTING MATTERS	1
TTRAIN	TODAY: TRAINING OF PERSONNEL	1
TCOMPSW	TODAY: COMPUTER SUPPORT STAFF	1
TPRODPRO	TODAY: PRODUCTION OF PRODUCT/SERVICE	1
TSALES	TODAY: SALES	1
TMKTRES	TODAY: MARKET RESEARCH	1
TAFTSALE	TODAY: AFTER SALES SERVICE	1
TSTRATPL	TODAY: STRATEGIC PLANNING	1
TINNOV	TODAY: INNOVATION	1
TLEGAL	TODAY: LEGAL MATTERS	1
TOTHER	TODAY: OTHER	1
TOTHER2	TODAY: OTHER2	1
WACC	DATE OF CHANGE: ACCOUNTING MATTERS	
ATRAIN	DATE OF CHANGE: TRAINING OF PERSONNEL	
WCOMPSW	DATE OF CHANGE: COMPUTER SUPPORT STAFF	
WPRODPRO	DATE OF CHANGE: PRODUCTION OF PRODUCT/SERVICE	
WSALES	DATE OF CHANGE: SALES	
WMKTRES	DATE OF CHANGE: MARKET RESEARCH	
WASALES	DATE OF CHANGE: AFTER SALES SERVICE	
WSTRATPL	DATE OF CHANGE: STRATEGIC PLANNING	
WINNOV	DATE OF CHANGE: INNOVATION	
ELEGAL	DATE OF CHANGE: LEGAL MATTERS	
WOTHER	DATE OF CHANGE: OTHER	
WOTHER2	DATE OF CHANGE: OTHER2	
CONAIM	WHY CONTINUE TO OPERATE TODAY	13
OCONAIM	OTHER AIM FOR OPERATION TODAY	
HOPEMET	EXPECTATIONS MET	1
COWSHIP	CHANGE: OWNERSHIP	1
CLEGALF	CHANGE: LEGAL FORM	1
CTECH	CHANGE: TECHNICAL	1
CLOCAT	CHANGE: LOCATION	1
CCASH	CHANGE: CASHFLOW	1
CINNOVA	CHANGE: INNOVATION	1
CLINE	CHANGE: LINE OF BUSINESS	1
CINVEST	CHANGE: INVESTMENT	1
COUTLET	CHANGE: NUMBER OF OUTLETS	1
CNICHES	CHANGE: MARKET NICHES	1
CPRODRA	CHANGE: PRODUCT RANGE	1
CMKTPOS	CHANGE: MARKET POSITIONING	1
CDIVERS	CHANGE: DIVERSIFICATION	1
CASSET	CHANGE: ASSETS	1
CCAPAC	CHANGE: CAPACITY	1
CINPUTS	CHANGE: INPUTS	1
CMGT	CHANGE: MANAGEMENT	1
COTHR	CHANGE: OTHER	1
SCOTHR	SPECIFY CHANGE OTHER	
COTHER2	CHANGE: OTHER2	1
SCOTHER2	SPECIFY CHANGE OTHER2	
TOWSHIP	TIME OF CHANGE: OWNERSHIP	
LEGALT	TIME OF CHANGE: LEGAL FORM	
TTECH	TIME OF CHANGE: TECHNICAL	
TLOCAT	TIME OF CHANGE: LOCATION	

TCASH	TIME OF CHANGE: CASHFLOW	
TINNOVA	TIME OF CHANGE: INNOVATION	
TLINE	TIME OF CHANGE: LINE OF BUSINESS	
TINVEST	TIME OF CHANGE: INVESTMENT	
TOUTLET	TIME OF CHANGE: NUMBER OF OUTLETS	
TMKTNIC	TIME OF CHANGE: MARKET NICHES	
TPRODRA	TIME OF CHANGE: PRODUCT RANGE	
TMKTPOS	TIME OF CHANGE: MARKET POSITIONING	
TDIVERS	TIME OF CHANGE: DIVERSIFICATION	
TASSET	TIME OF CHANGE: ASSETS	
TCAPAC	TIME OF CHANGE: CAPACITY	
TINPUTS	TIME OF CHANGE: INPUTS	
TMGT	TIME OF CHANGE: MANAGEMENT	
TOTHR	TIME OF CHANGE: OTHER	
TOTHR2	TIME OF CHANGE: OTHER2	
FNBCHAN	FIRST MOST IMPORTANT CHANGE	
SNBCHAN	SECONF MOST IMPORTANT CHANGE	
TNBCHAN	THIRD MOST IMPORTANT CHANGE	
PF1GROW	PRECIPITATOR FACTOR 1: GROWTH	1
TPF1GRO	PRECIPITATOR TIME 1: GROWTH	
PF1DEM	PRECIPITATOR FACTOR 1: DEMAND	1
TPF1DEM	PRECIPITATOR TIME 1: DEMAND	
PF1NICH	PRECIPITATOR FACTOR 1: NEW NICHES	1
TPF1NICH	PRECIPITATOR TIME 1: NEW NICHES	
PF1TAXEF	PRECIPITATOR FACTOR 1: TAX EFFICIENCY	1
TPF1TAXE	PRECIPITATOR TIME 1: TAX EFFICIENCY	
PF1CREDP	PRECIPITATOR FACTOR 1: CREDIT POLICY	1
TPF1CRED	PRECIPITATOR TIME 1: CREDIT POLICY	
PF1FIN	PRECIPITATOR FACTOR 1: FINANCE	1
TPF1FIN	PRECIPITATOR TIME 1: FINANCE	
PF1PROFT	PRECIPITATOR FACTOR 1: PROFITABILITY	1
TPF1PROF	PRECIPITATOR TIME 1: PROFITABILITY	
PF1COST	PRECIPITATOR FACTOR 1: COST CHANGES	1
TPF1COST	PRECIPITATOR TIME 1: COST CHANGES	
PF1SALES	PRECIPITATOR FACTOR 1: SALES	1
TPF1SALE	PRECIPITATOR TIME 1: SALES	
PF1COMP	PRECIPITATOR FACTOR 1: COMPETITION	1
TPF1COMP	PRECIPITATOR TIME 1: COMPETITION	
PF1MARK	PRECIPITATOR FACTOR 1: MARKETING	1
TPF1MARK	PRECIPITATOR TIME 1: MARKETING	
PF1TRAIN	PRECIPITATOR FACTOR 1: TRADE INTELLIGENCE	1
TPF1TRAI	PRECIPITATOR TIME 1: TRADE INTELLIGENCE	
PF1CAPAC	PRECIPITATOR FACTOR 1: CAPACITY	1
TPF1CAP	PRECIPITATOR TIME 1: CAPACITY	
PF1ACCBU	PRECIPITATOR FACTOR 1: ACCESS TO BUYERS	1
TPF1ACCB	PRECIPITATOR TIME 1: ACCESS TO BUYERS	
PF1STOCK	PRECIPITATOR FACTOR 1: STOCK LEVELS	1
TPF1STOC	PRECIPITATOR TIME 1: STOCK LEVELS	
PF1REG	PRECIPITATOR FACTOR 1: REGULATION	1
TPF1REG	PRECIPITATOR TIME 1: REGULATION	
PF1TECH	PRECIPITATOR FACTOR 1: TECHNOLOGY	1
TPF1TECH	PRECIPITATOR TIME 1: TECHNOLOGY	
PF1OPEFF	PRECIPITATOR FACTOR 1: OPERATIONAL EFFICIENCY	1

TPF1OPEF	PRECIPITATOR TIME 1: OPERATIONAL EFFICIENCY	
PF1INVES	PRECIPITATOR FACTOR 1: INVESTMENT	1
TPF1INV	PRECIPITATOR TIME 1: INVESTMENT	
PF1DSUP	PRECIPITATOR FACTOR 1: DELINQUENT SUPPLIERS	1
TPF1DSUP	PRECIPITATOR TIME 1: DELINQUENT SUPPLIERS	
PF1DDEB	PRECIPITATOR FACTOR 1: DELINQUENT DEBTORS	1
TPF1DEB	PRECIPITATOR TIME 1: DELINQUENT DEBTORS	
PF1HEAD	PRECIPITATOR FACTOR 1: HEADCOUNT	1
TPF1HEAD	PRECIPITATOR TIME 1: HEADCOUNT	
PF1CCONT	PRECIPITATOR FACTOR 1: COST CONTROL	1
TPF1CONT	PRECIPITATOR TIME 1: COST CONTROL	
PF1SKILL	PRECIPITATOR FACTOR 1: SKILLS	1
TPF1SKIL	PRECIPITATOR TIME 1: SKILLS	
PF1MIX	PRECIPITATOR FACTOR 1: MIX OF SUPPLIERS/CUSTOMER/RIVALS	1
TPF1MIX	PRECIPITATOR TIME 1: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	
PF1MON	PRECIPITATOR FACTOR 1: MONITORING	1
TPF1MON	PRECIPITATOR TIME 1: MONITORING	
PF1MGR	PRECIPITATOR FACTOR 1: FUNCTIONS OF MANAGER	1
TPF1MGR	PRECIPITATOR TIME 1: FUNCTIONS OF MANAGER	
PF1CASH	PRECIPITATOR FACTOR 1: CASHFLOW	1
TPF1CASH	PRECIPITATOR TIME 1: CASHFLOW	
PF1OTH	PRECIPITATOR FACTOR 1: OTHER	1
TPF1OTH	PRECIPITATOR TIME 1: OTHER	
SPF1OTH	SPECIFY PRECIPITATOR TIME 1: OTHER	
PF1OTH2	PRECIPITATOR FACTOR 1: OTHER2	1
TPF1OTH2	PRECIPITATOR TIME 1: OTHER 2	
SPF1OTH2	SPECIFY PRECIPITATOR TIME 1: OTHER 2	
AF1GROW	ADJUSTMENT FACTOR 1: GROWTH	1
TAF1GRO	ADJUSTMENT TIME 1: GROWTH	
AF1DEM	ADJUSTMENT FACTOR 1: DEMAND	1
TAF1DEM	ADJUSTMENT TIME 1: DEMAND	
AF1NICH	ADJUSTMENT FACTOR 1: NEW NICHES	1
TAF1NICH	ADJUSTMENT TIME 1: NEW NICHES	
AF1TAXEF	ADJUSTMENT FACTOR 1: TAX EFFICIENCY	1
TAF1TAXE	ADJUSTMENT TIME 1: TAX EFFICIENCY	
AF1CREDP	ADJUSTMENT FACTOR 1:CREDIT POLICY	1
TAF1CRED	ADJUSTMENT TIME 1:CREDIT POLICY	
AF1FIN	ADJUSTMENT FACTOR 1: FINANCE	1
TAF1FIN	ADJUSTMENT TIME 1: FINANCE	
AF1PROFT	ADJUSTMENT FACTOR 1: PROFITABILITY	1
TAF1PROF	ADJUSTMENT TIME 1: PROFITABILITY	
AF1COST	ADJUSTMENT FACTOR 1: COST CHANGES	1
TAF1COST	ADJUSTMENT TIME 1: COST CHANGES	
AF1SALES	ADJUSTMENT FACTOR 1: SALES	1
TAF1SALE	ADJUSTMENT TIME 1: SALES	
AF1COMP	ADJUSTMENT FACTOR 1: COMPETITION	1
TAF1COMP	ADJUSTMENT TIME 1: COMPETITION	
AF1MARK	ADJUSTMENT FACTOR 1: MARKETING	1
TAF1MARK	ADJUSTMENT TIME 1: MARKETING	
AF1TRAIN	ADJUSTMENT FACTOR 1: TRADE INTELLIGENCE	1
TAF1TRAI	ADJUSTMENT TIME 1: TRADE INTELLIGENCE	
AF1CAPAC	ADJUSTMENT FACTOR 1: CAPACITY	1

TAF1CAP	ADJUSTMENT TIME 1: CAPACITY	
AF1ACCBU	ADJUSTMENT FACTOR 1: ACCESS TO BUYERS	1
TAF1ACCB	ADJUSTMENT TIME 1: ACCESS TO BUYERS	
AF1STOCK	ADJUSTMENT FACTOR 1: STOCK LEVELS	1
TAF1STOC	ADJUSTMENT TIME 1: STOCK LEVELS	
AF1REG	ADJUSTMENT FACTOR 1: REGULATION	1
TAF1REG	ADJUSTMENT TIME 1:REGULATION	
AF1TECH	ADJUSTMENT FACTOR 1: TECHNOLOGY	1
TAF1TECH	ADJUSTMENT TIME 1: TECHNOLOGY	
AF1OPEFF	ADJUSTMENT FACTOR 1: OPERATIONAL EFFICIENCY	1
TAF1OPEF	ADJUSTMENT TIME 1: OPERATIONAL EFFICIENCY	
AF1INVES	ADJUSTMENT FACTOR 1: INVESTMENT	1
TAF1INV	ADJUSTMENT TIME 1: INVESTMENT	
AF1DSUP	ADJUSTMENT FACTOR 1: DELINQUENT SUPPLIERS	1
TAF1DSUP	ADJUSTMENT TIME 1: DELINQUENT SUPPLIERS	
AF1DDEB	ADJUSTMENT FACTOR 1: DELINQUENT DEBTORS	1
TAF1DEB	ADJUSTMENT TIME 1: DELINQUENT DEBTORS	
AF1HEAD	ADJUSTMENT FACTOR 1: HEADCOUNT	1
TAF1HEAD	ADJUSTMENT TIME 1: HEADCOUNT	
AF1CCONT	ADJUSTMENT FACTOR 1: COST CONTROL	1
TAF1CONT	ADJUSTMENT TIME 1: COST CONTROL	
AF1SKILL	ADJUSTMENT FACTOR 1: SKILLS	1
TAF1SKIL	ADJUSTMENT TIME 1: SKILLS	
AF1MIX	ADJUSTMENT FACTOR 1: MIX OF SUPPLIERS/CUSTOMERS /RIVALS	1
TAF1MIX	ADJUSTMENT TIME 1: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	
AF1MON	ADJUSTMENT FACTOR 1: MONITORING	1
TAF1MON	ADJUSTMENT TIME 1: MONITORING	
AF1MGR	ADJUSTMENT FACTOR 1: FUNCTIONS OF MANAGER	1
TAF1MGR	ADJUSTMENT TIME 1: FUNCTIONS OF MANAGER	
AF1CASH	ADJUSTMENT FACTOR 1: CASHFLOW	1
TAF1CASH	ADJUSTMENT TIME 1: CASHFLOW	
AF1OTH	ADJUSTMENT FACTOR 1: OTHER	1
TAF1OTH	ADJUSTMENT TIME 1: OTHER	
SAF1OTH	SPECIFY ADJUSTMENT TIME 1: OTHER	
AF1OTH2	ADJUSTMENT FACTOR 1: OTHER	1
TAF1OTH2	ADJUSTMENT TIME 1: OTHER	
SAF1OTH2	SPECIFY ADJUSTMENT TIME 1: OTHER	
PF2GROW	PRECIPITATOR FACTOR 2: GROWTH	1
TPF2GRO	PRECIPITATOR TIME 2: GROWTH	
PF2DEM	PRECIPITATOR FACTOR 2: DEMAND	1
TPF2DEM	PRECIPITATOR TIME 2: DEMAND	
PF2NICH	PRECIPITATOR FACTOR 2: NEW NICHES	1
TPF2NICH	PRECIPITATOR TIME 2: NEW NICHES	
PF2TAXEF	PRECIPITATOR FACTOR 2: TAX EFFICIENCY	1
TPF2TAXE	PRECIPITATOR TIME 2: TAX EFFICIENCY	
PF2CREDP	PRECIPITATOR FACTOR 2: CREDIT POLICY	1
TPF2CRED	PRECIPITATOR TIME 2: CREDIT POLICY	
PF2FIN	PRECIPITATOR FACTOR 2: FINANCE	1
TPF2FIN	PRECIPITATOR TIME 2: FINANCE	
PF2PROFT	PRECIPITATOR FACTOR 2: PROFITABILITY	1
TPF2PROF	PRECIPITATOR TIME 2: PROFITABILITY	

PF2COST	PRECIPITATOR FACTOR 2: COST CHANGES	1
TPF2COST	PRECIPITATOR TIME 2: COST CHANGES	
PF2SALES	PRECIPITATOR FACTOR 2: SALES	1
TPF2SALE	PRECIPITATOR TIME 2: SALES	
PF2COMP	PRECIPITATOR FACTOR 2: COMPETITION	1
TPF2COMP	PRECIPITATOR TIME 2: COMPETITION	
PF2MARK	PRECIPITATOR FACTOR 2: MARKETING	1
TPF2MARK	PRECIPITATOR TIME 2: MARKETING	
PF2TRAIN	PRECIPITATOR FACTOR 2: TRADE INTELLIGENCE	1
TPF2TRAI	PRECIPITATOR TIME 2: TRADE INTELLIGENCE	
PF2CAPAC	PRECIPITATOR FACTOR 2: CAPACITY	1
TPF2CAP	PRECIPITATOR TIME 2: CAPACITY	
PF2ACCBU	PRECIPITATOR FACTOR 2: ACCESS TO BUYERS	1
TPF2ACCB	PRECIPITATOR TIME 2: ACCESS TO BUYERS	
PF2STOCK	PRECIPITATOR FACTOR 2: STOCK LEVELS	1
TPF2STOC	PRECIPITATOR TIME 2: STOCK LEVELS	
PF2REG	PRECIPITATOR FACTOR 2: REGULATION	1
TPF2REG	PRECIPITATOR TIME 2: REGULATION	
PF2TECH	PRECIPITATOR FACTOR 2: TECHNOLOGY	1
TPF2TECH	PRECIPITATOR TIME 2: TECHNOLOGY	
PF2OPEFF	PRECIPITATOR FACTOR 2: OPERATIONAL EFFICIENCY	1
TPF2OPEF	PRECIPITATOR TIME 2: OPERATIONAL EFFICIENCY	
PF2INVES	PRECIPITATOR FACTOR 2: INVESTMENT	1
TPF2INV	PRECIPITATOR TIME 2: INVESTMENT	
PF2DSUP	PRECIPITATOR FACTOR 2: DELINQUENT SUPPLIERS	1
TPF2DSUP	PRECIPITATOR TIME 2: DELINQUENT SUPPLIERS	
PF2DDEB	PRECIPITATOR FACTOR 2: DELINQUENT DEBTORS	1
TPF2DEB	PRECIPITATOR TIME 2: DELINQUENT DEBTORS	
PF2HEAD	PRECIPITATOR FACTOR 2: HEADCOUNT	1
TPF2HEAD	PRECIPITATOR TIME 2: HEADCOUNT	
PF2CCONT	PRECIPITATOR FACTOR 2: COST CONTROL	1
TPF2CONT	PRECIPITATOR TIME 2: COST CONTROL	
PF2SKILL	PRECIPITATOR FACTOR 2: SKILLS	1
TPF2SKIL	PRECIPITATOR TIME 2: SKILLS	
PF2MIX	PRECIPITATOR FACTOR 2: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	1
TPF2MIX	PRECIPITATOR TIME 2: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	
PF2MON	PRECIPITATOR FACTOR 2: MONITORING	1
TPF2MON	PRECIPITATOR TIME 2: MONITORING	
PF2MGR	PRECIPITATOR FACTOR 2: FUNCTIONS OF MANAGER	1
TPF2MGR	PRECIPITATOR TIME 2: FUNCTIONS OF MANAGER	
PF2CASH	PRECIPITATOR FACTOR 2: CASHFLOW	1
TPF2CASH	PRECIPITATOR TIME 2: CASHFLOW	
PF2OTH	PRECIPITATOR FACTOR 2: OTHER	1
TPF2OTH	PRECIPITATOR TIME 2: OTHER	
SPF2OTH	SPECIFY PRECIPITATOR TIME 2: OTHER	
PF2OTH2	PRECIPITATOR FACTOR 2: OTHER2	1
TPF2OTH2	PRECIPITATOR TIME 2: OTHER2	
SPF2OTH2	SPECIFY PRECIPITATOR TIME 2: OTHER	
AF2GROW	ADJUSTMENT FACTOR 2: GROWTH	1
TAF2GRO	ADJUSTMENT TIME 2: GROWTH	
AF2DEM	ADJUSTMENT FACTOR 2: DEMAND	1
TAF2DEM	ADJUSTMENT TIME 2: DEMAND	

AF2NICH	ADJUSTMENT FACTOR 2: NEW NICHES	1
TAF2NICH	ADJUSTMENT TIME 2: NEW NICHES	
AF2TAXEF	ADJUSTMENT FACTOR 2: TAX EFFICIENCY	1
TAF2TAXE	ADJUSTMENT TIME 2: TAX EFFICIENCY	
AF2CREDP	ADJUSTMENT FACTOR 2:CREDIT POLICY	1
TAF2CRED	ADJUSTMENT TIME 2:CREDIT POLICY	
AF2FIN	ADJUSTMENT FACTOR 2: FINANCE	1
TAF2FIN	ADJUSTMENT TIME 2: FINANCE	
AF2PROFT	ADJUSTMENT FACTOR 2: PROFITABILITY	1
TAF2PROF	ADJUSTMENT TIME 2: PROFITABILITY	
AF2COST	ADJUSTMENT FACTOR 2: COST CHANGES	1
TAF2COST	ADJUSTMENT TIME 2: COST CHANGES	
AF2SALES	ADJUSTMENT FACTOR 2: SALES	1
TAF2SALE	ADJUSTMENT TIME 2: SALES	
AF2COMP	ADJUSTMENT FACTOR 2: COMPETITION	1
TAF2COMP	ADJUSTMENT TIME 2: COMPETITION	
AF2MARK	ADJUSTMENT FACTOR 2: MARKETING	1
TAF2MARK	ADJUSTMENT TIME 2: MARKETING	
AF2TRAIN	ADJUSTMENT FACTOR 2: TRADE INTELLIGENCE	1
TAF2TRAI	ADJUSTMENT TIME 2: TRADE INTELLIGENCE	
AF2CAPAC	ADJUSTMENT FACTOR 2: CAPACITY	1
TAF2CAP	ADJUSTMENT TIME 2: CAPACITY	
AF2ACCBU	ADJUSTMENT FACTOR 2: ACCESS TO BUYERS	1
TAF2ACCB	ADJUSTMENT TIME 2: ACCESS TO BUYERS	
AF2STOCK	ADJUSTMENT FACTOR 2: STOCK LEVELS	1
TAF2STOC	ADJUSTMENT TIME 2: STOCK LEVELS	
AF2REG	ADJUSTMENT FACTOR 2:CREGULATION	1
TAF2REG	ADJUSTMENT TIME 2:CREGULATION	
AF2TECH	ADJUSTMENT FACTOR 2: TECHNOLOGY	1
TAF2TECH	ADJUSTMENT TIME 2: TECHNOLOGY	
AF2OPEFF	ADJUSTMENT FACTOR 2: OPERATIONAL EFFICIENCY	1
TAF2OPEF	ADJUSTMENT TIME 2: OPERATIONAL EFFICIENCY	
AF2INVES	ADJUSTMENT FACTOR 2: INVESTMENT	1
TAF2INV	ADJUSTMENT TIME 2: INVESTMENT	
AF2DSUP	ADJUSTMENT FACTOR 2: DELINQUENT SUPPLIERS	1
TAF2DSUP	ADJUSTMENT TIME 2: DELINQUENT SUPPLIERS	
AF2DDEB	ADJUSTMENT FACTOR 2: DELINQUENT DEBTORS	1
TAF2DEB	ADJUSTMENT TIME 2: DELINQUENT DEBTORS	
AF2HEAD	ADJUSTMENT FACTOR 2: HEADCOUNT	1
TAF2HEAD	ADJUSTMENT TIME 2: HEADCOUNT	
AF2CCONT	ADJUSTMENT FACTOR 2: COST CONTROL	1
TAF2CONT	ADJUSTMENT TIME 2: COST CONTROL	
AF2SKILL	ADJUSTMENT FACTOR 2: SKILLS	1
TAF2SKIL	ADJUSTMENT TIME 2: SKILLS	
AF2MIX	ADJUSTMENT FACTOR 2: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	1
TAF2MIX	ADJUSTMENT TIME 2: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	
AF2MON	ADJUSTMENT FACTOR 2: MONITORING	1
TAF2MON	ADJUSTMENT TIME 2: MONITORING	
AF2MGR	ADJUSTMENT FACTOR 2: FUNCTIONS OF MANAGER	1
TAF2MGR	ADJUSTMENT TIME 2: FUNCTIONS OF MANAGER	
AF2CASH	ADJUSTMENT FACTOR 2: CASHFLOW	1
TAF2CASH	ADJUSTMENT TIME 2: CASHFLOW	

AF2OTH	ADJUSTMENT FACTOR 2: OTHER	1
TAF2OTH	ADJUSTMENT TIME 2: OTHER	
SAF2OTH	SPECIFY ADJUSTMENT TIME 2: OTHER	
AF2OTH2	ADJUSTMENT FACTOR 2: OTHER2	1
TAF2OTH2	ADJUSTMENT TIME 2: OTHER2	
SAF2OTH2	SPECIFY ADJUSTMENT TIME 2: OTHER	
PF3GROW	PRECIPITATOR FACTOR 3: GROWTH	1
TPF3GRO	PRECIPITATOR TIME 3: GROWTH	
PF3DEM	PRECIPITATOR FACTOR 3: DEMAND	1
TPF3DEM	PRECIPITATOR TIME 3: DEMAND	
PF3NICH	PRECIPITATOR FACTOR 3: NEW NICHES	1
TPF3NICH	PRECIPITATOR TIME 3: NEW NICHES	
PF3TAXEF	PRECIPITATOR FACTOR 3: TAX EFFICIENCY	1
TPF3TAXE	PRECIPITATOR TIME 3: TAX EFFICIENCY	
PF3CREDP	PRECIPITATOR FACTOR 3: CREDIT POLICY	1
TPF3CRED	PRECIPITATOR TIME 3: CREDIT POLICY	
PF3FIN	PRECIPITATOR FACTOR 3: FINANCE	1
TPF3FIN	PRECIPITATOR TIME 3: FINANCE	
PF3PROFT	PRECIPITATOR FACTOR 3: PROFITABILITY	1
TPF3PROF	PRECIPITATOR TIME 3: PROFITABILITY	
PF3COST	PRECIPITATOR FACTOR 3: COST CHANGES	1
TPF3COST	PRECIPITATOR TIME 3: COST CHANGES	
PF3SALES	PRECIPITATOR FACTOR 3: SALES	1
TPF3SALE	PRECIPITATOR TIME 3: SALES	
PF3COMP	PRECIPITATOR FACTOR 3: COMPETITION	1
TPF3COMP	PRECIPITATOR TIME 3: COMPETITION	
PF3MARK	PRECIPITATOR FACTOR 3: MARKETING	1
TPF3MARK	PRECIPITATOR TIME 3: MARKETING	
PF3TRAIN	PRECIPITATOR FACTOR 3: TRADE INTELLIGENCE	1
TPF3TRAI	PRECIPITATOR TIME 3: TRADE INTELLIGENCE	
PF3CAPAC	PRECIPITATOR FACTOR 3: CAPACITY	1
TPF3CAP	PRECIPITATOR TIME 3: CAPACITY	
PF3ACCBU	PRECIPITATOR FACTOR 3: ACCESS TO BUYERS	1
TPF3ACCB	PRECIPITATOR TIME 3: ACCESS TO BUYERS	
PF3STOCK	PRECIPITATOR FACTOR 3: STOCK LEVELS	1
TPF3STOC	PRECIPITATOR TIME 3: STOCK LEVELS	
PF3REG	PRECIPITATOR FACTOR 3: REGULATION	1
TPF3REG	PRECIPITATOR TIME 3: REGULATION	
PF3TECH	PRECIPITATOR FACTOR 3: TECHNOLOGY	1
TPF3TECH	PRECIPITATOR TIME 3: TECHNOLOGY	
PF3OPEFF	PRECIPITATOR FACTOR 3: OPERATIONAL EFFICIENCY	1
TPF3OPEF	PRECIPITATOR TIME 3: OPERATIONAL EFFICIENCY	
PF3INVES	PRECIPITATOR FACTOR 3: INVESTMENT	1
TPF3INV	PRECIPITATOR TIME 3: INVESTMENT	
PF3DSUP	PRECIPITATOR FACTOR 3: DELINQUENT SUPPLIERS	1
TPF3DSUP	PRECIPITATOR TIME 3: DELINQUENT SUPPLIERS	
PF3DDEB	PRECIPITATOR FACTOR 3: DELINQUENT DEBTORS	1
TPF3DEB	PRECIPITATOR TIME 3: DELINQUENT DEBTORS	
PF3HEAD	PRECIPITATOR FACTOR 3: HEADCOUNT	1
TPF3HEAD	PRECIPITATOR TIME 3: HEADCOUNT	
PF3CCONT	PRECIPITATOR FACTOR 3: COST CONTROL	1
TPF3CONT	PRECIPITATOR TIME 3: COST CONTROL	
PF3SKILL	PRECIPITATOR FACTOR 3: SKILLS	1

TPF3SKIL	PRECIPITATOR TIME 3: SKILLS	
PF3MIX	PRECIPITATOR FACTOR 3: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	1
TPF3MIX	PRECIPITATOR TIME 3: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	
PF3MON	PRECIPITATOR FACTOR 3: MONITORING	1
TPF3MON	PRECIPITATOR TIME 3: MONITORING	
PF3MGR	PRECIPITATOR FACTOR 3: FUNCTIONS OF MANAGER	1
TPF3MGR	PRECIPITATOR TIME 3: FUNCTIONS OF MANAGER	
PF3CASH	PRECIPITATOR FACTOR 3: CASHFLOW	1
TPF3CASH	PRECIPITATOR TIME 3: CASHFLOW	
PF3OTH	PRECIPITATOR FACTOR 3: OTHER	1
TPF3OTH	PRECIPITATOR TIME 3: OTHER	
SPF3OTH	SPECIFY PRECIPITATOR TIME 3: OTHER	
PF3OTH2	PRECIPITATOR FACTOR 3: OTHER2	1
TPF3OTH2	PRECIPITATOR TIME 3: OTHER2	
SPF3OTH3	SPECIFY PRECIPITATOR TIME 3: OTHER	
AF3GROW	ADJUSTMENT FACTOR 3: GROWTH	1
TAF3GRO	ADJUSTMENT TIME 3: GROWTH	
AF3DEM	ADJUSTMENT FACTOR 3: DEMAND	1
TAF3DEM	ADJUSTMENT TIME 3: DEMAND	
AF3NICH	ADJUSTMENT FACTOR 3: NEW NICHES	1
TAF3NICH	ADJUSTMENT TIME 3: NEW NICHES	
AF3TAXEF	ADJUSTMENT FACTOR 3: TAX EFFICIENCY	1
TAF3TAXE	ADJUSTMENT TIME 3: TAX EFFICIENCY	
AF3CREDP	ADJUSTMENT FACTOR 3:CREDIT POLICY	1
TAF3CRED	ADJUSTMENT TIME 3:CREDIT POLICY	
AF3FIN	ADJUSTMENT FACTOR 3: FINANCE	1
TAF3FIN	ADJUSTMENT TIME 3: FINANCE	
AF3PROFT	ADJUSTMENT FACTOR 3: PROFITABILITY	1
TAF3PROF	ADJUSTMENT TIME 3: PROFITABILITY	
AF3COST	ADJUSTMENT FACTOR 3: COST CHANGES	1
TAF3COST	ADJUSTMENT TIME 3: COST CHANGES	
AF3SALES	ADJUSTMENT FACTOR 3: SALES	1
TAF3SALE	ADJUSTMENT TIME 3: SALES	
AF3COMP	ADJUSTMENT FACTOR 3: COMPETITION	1
TAF3COMP	ADJUSTMENT TIME 3: COMPETITION	
AF3MARK	ADJUSTMENT FACTOR 3: MARKETING	1
TAF3MARK	ADJUSTMENT TIME 3: MARKETING	
AF3TRAIN	ADJUSTMENT FACTOR 3: TRADE INTELLIGENCE	1
TAF3TRAI	ADJUSTMENT TIME 3: TRADE INTELLIGENCE	
AF3CAPAC	ADJUSTMENT FACTOR 3: CAPACITY	1
TAF3CAP	ADJUSTMENT TIME 3: CAPACITY	
AF3ACCBU	ADJUSTMENT FACTOR 3: ACCESS TO BUYERS	1
TAF3ACCB	ADJUSTMENT TIME 3: ACCESS TO BUYERS	
AF3STOCK	ADJUSTMENT FACTOR 3: STOCK LEVELS	1
TAF3STOC	ADJUSTMENT TIME 3: STOCK LEVELS	
AF3REG	ADJUSTMENT FACTOR 3:CREGULATION	1
TAF3REG	ADJUSTMENT TIME 3:CREGULATION	
AF3TECH	ADJUSTMENT FACTOR 3: TECHNOLOGY	1
TAF3TECH	ADJUSTMENT TIME 3: TECHNOLOGY	
AF3OPEFF	ADJUSTMENT FACTOR 3: OPERATIONAL EFFICIENCY	1
TAF3OPEF	ADJUSTMENT TIME 3: OPERATIONAL EFFICIENCY	
AF3INVES	ADJUSTMENT FACTOR 3: INVESTMENT	1

TAF3INV	ADJUSTMENT TIME 3: INVESTMENT	
AF3DSUP	ADJUSTMENT FACTOR 3: DELINQUENT SUPPLIERS	1
TAF3DSUP	ADJUSTMENT TIME 3: DELINQUENT SUPPLIERS	
AF3DDEB	ADJUSTMENT FACTOR 3: DELINQUENT DEBTORS	1
TAF3DEB	ADJUSTMENT TIME 3: DELINQUENT DEBTORS	
AF3HEAD	ADJUSTMENT FACTOR 3: HEADCOUNT	1
TAF3HEAD	ADJUSTMENT TIME 3: HEADCOUNT	
AF3CCONT	ADJUSTMENT FACTOR 3: COST CONTROL	1
TAF3CONT	ADJUSTMENT TIME 3: COST CONTROL	
AF3SKILL	ADJUSTMENT FACTOR 3: SKILLS	1
TAF3SKIL	ADJUSTMENT TIME 3: SKILLS	
AF3MIX	ADJUSTMENT FACTOR 3: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	1
TAF3MIX	ADJUSTMENT TIME 3: MIX OF SUPPLIERS/CUSTOMERS/ RIVALS	
AF3MON	ADJUSTMENT FACTOR 3: MONITORING	1
TAF3MON	ADJUSTMENT TIME 3: MONITORING	
AF3MGR	ADJUSTMENT FACTOR 3: FUNCTIONS OF MANAGER	1
TAF3MGR	ADJUSTMENT TIME 3: FUNCTIONS OF MANAGER	
AF3CASH	ADJUSTMENT FACTOR 3: CASHFLOW	1
TAF3CASH	ADJUSTMENT TIME 3: CASHFLOW	
AF3OTH	ADJUSTMENT FACTOR 3: OTHER	1
TAF3OTH	ADJUSTMENT TIME 3: OTHER	
SAF3OTH	SPECIFY ADJUSTMENT TIME 3: OTHER	
AF3OTH2	ADJUSTMENT FACTOR 3: OTHER2	1
TAF3OTH2	ADJUSTMENT TIME 3: OTHER2	
SAF3OTH3	SPECIFY ADJUSTMENT TIME 3: OTHER	
FSSUP	FACTORS WHICH FOSTERED SURVIVAL: SUPPLIERS	
FSGROW	FACTORS WHICH FOSTERED SURVIVAL: GROWTH	
FSCOMP	FACTORS WHICH FOSTERED SURVIVAL: COMPETITION	
FSBUYWTP	FACTORS WHICH FOSTERED SURVIVAL: BUYERS WILLINGNESS TO PAY	
FSCUSTLO	FACTORS WHICH FOSTERED SURVIVAL: CUSTOMER LOYALTY	
FSACCBUY	FACTORS WHICH FOSTERED SURVIVAL: ACCESS TO BUYERS	
FSSUB	FACTORS WHICH FOSTERED SURVIVAL: SUBSTITUTES	
FSNWENT	FACTORS WHICH FOSTERED SURVIVAL: NEW ENTRANTS	
FSTECH	FACTORS WHICH FOSTERED SURVIVAL: TECHNOLOGY	
FSRIVINN	FACTORS WHICH FOSTERED SURVIVAL: RIVAL'S INNOVATION	
FSREG	FACTORS WHICH FOSTERED SURVIVAL: REGULATION	
FSCASH	FACTORS WHICH FOSTERED SURVIVAL: CASHFLOW	
FSDEBT	FACTORS WHICH FOSTERED SURVIVAL: DEBT	
FSCREDP	FACTORS WHICH FOSTERED SURVIVAL:CREDIT POLICY	
FSCAPREQ	FACTORS WHICH FOSTERED SURVIVAL: CAPITAL REQUIREMENTS	
FSLOCAT	FACTORS WHICH FOSTERED SURVIVAL: LOCATION	
FSCOSTC	FACTORS WHICH FOSTERED SURVIVAL: COST CONTROL	
FSQUAL	FACTORS WHICH FOSTERED SURVIVAL: QUALITY	
FSMKTRES	FACTORS WHICH FOSTERED SURVIVAL: MARKET RESEARCH	
FSDIFF	FACTORS WHICH FOSTERED SURVIVAL: DIFFERENTIATION	
FSADVERT	FACTORS WHICH FOSTERED SURVIVAL: ADVERTISING	
FSPROMIX	FACTORS WHICH FOSTERED SURVIVAL: PRODUCT MIX	
FSDIVERS	FACTORS WHICH FOSTERED SURVIVAL: DIVERSIFICATION	
FSOPEFF	FACTORS WHICH FOSTERED SURVIVAL: OPERATIONAL EFFICIENCY	

FSSKILLS	FACTORS WHICH FOSTERED SURVIVAL: SKILLS	
FSMONIT	FACTORS WHICH FOSTERED SURVIVAL: MONITORING	
FSPROFGA	FACTORS WHICH FOSTERED SURVIVAL: FILLING PRODUCT GAPS	
EXPFUTT	EXPECTED TO TRADE WELL INTO FUTURE	1
EXITSTRA	EXIT STRATEGY	14
OTHEXIT	SPECIFY OTHER EXIT STRATEGY	
INNOVST	LEVEL OF INNOVATIVENESS AT START-UP	15
TYPEINNO	TYPE OF INNOVATION	16
SOTYPEIN	SPECIFY OTHER TYPE OF INNOVATION	
PROINNO	EXTENT OF PROCESS INNOVATION SINCE START-UP	17
WHYPRIN	WHY PROCESS INNOVATION TO THIS EXTENT	18
OWHY	OTHER REASON WHY PROCESS INNOVATION TO THIS EXTENT	
RIVPROI	EXTENT OF PROCESS INNOVATION BY RIVALS	19
CRIVPRC	EXTENT OF COMPETITIVE PRESSURE BY RIVALS PROCESS INNOVATION	19
PRINNO	EXTENT OF PRODUCT INNOVATION SINCE START-UP	20
MORE20	NUMBER OF PRODUCTS MORE THAN 20	
REWARDS	REAP REWARDS FROM PRODUCT INNOVATIONS	21
FORMREW	FORM OF REWARDS	22
OFORMRE	OTHER FORM OF REWARDS	
DIFFLAUN	DIFFICULTIES IN LAUCHING NEW PRODUCTS	1
FORMDIFF	FORM OF DIFFICULTIES	23
OFORMDIF	OTHER FORM OF DIFFICULTIES	
RIVPRODI	EXTENT OF PRODUCT INNOVATION BY RIVALS	19
CRIVPROD	EXTENT OF COMPETITIVE PRESSURE BY RIVALS PRODUCT INNOVATION	19
PATENT	PATENTS	1
COPYRIG	COPYRIGHT	1
TRADMARK	TRADEMARKS	1
EXPLQUIC	EXPLOITATION OF INNOVATION RAPIDLY	1
OTHPROTI	METHODS TO PROTECT INNOVATIONS	1
OTHPROTS	SPECIFIC OTHER METHOD TO PROTECT INNOVATIONS	
TELEPHO	TELEPHONE	1
FAX	FAX	1
TELANS	TELEPHONE ANSWERING	1
EMAIL	ELECTRONIC MAIL	1
TVCONFER	TELEPHONE/VIDEO CONFERENCING	1
MOBILE	CELLULAR TELEPHONE	1
WEBSITE	WEBSITE	1
INTERNET	INTERNET	1
RADCOM	RADIO COMMUNICATION	1
PC	PERSONAL COMPUTERS	1
ELECTDB	ELECTRONIC DATABASES	1
OTHERIT1	OTHER IT 1	1
SOTHIT1	SPECIFIC OTHER IT 1	
OTHERIT2	OTHER IT 2	1
SOTHIT2	SPECIFIC OTHER IT 2	
NBIT	IMPOTANCE OF INFORMATION TECHNOLOGY	24
USEITNET	NETWORKING	1
USEITNAC	PRODUCING ACCOUNTS	1
USEITADM	MANAGING DEALINGS WITH BUYERS/SUPPLIERS	1
USEITPT	MONITORING PERFORMANCE TARGETS	1
USEITDES	DESIGNING NEW PRODUCTS	1

USEITRIV	**GATHERING INFORMATION ON THE ACTIVITIES OF RIVALS**	1
USEITOE	**OPERATIONAL EFFICIENCY**	1
USEITTAR	**SETTING TARGETS OR PLANS**	1
USITOTH	**OTHER USE OF INFORMATION TECHNOLOGY**	1
SUSITOTH	**SPECIFIED OTHER USE OF INFORMATION TECHNOLOFY**	
TECHCHGE	**TECHNICAL CHANGE**	1
INITCHGE	**PRIME INITATORS OF CHANGE**	25
OTHCHGE	**OTHER PRIME INITATORS OF CHANGE**	
IMPLTECH	**YOUR EXPERIENCE OF USING NEW TECHNOLOGIES**	26

APPENDIX 5: CASE ANALYSIS

5.1 Introduction

The purpose of this appendix is twofold. First, to illustrate what a long-lived small firm looks like, through examining a series of seven case profiles of mature small firms. Second, to use the qualitative evidence, gathered using the instrumentation developed for this study, to illustrate key aspects of the results. Qualitative evidence gathered early in the life of the long-lived small firms, particularly with respect to the Leverhulme (1985-1988) sample, is also analysed, where appropriate, to enrich the analysis from a longitudinal point of view, see Reid (1993) and Reid *et al.* (1993). No amount of econometric work and statistical analysis can convey the level of metamorphosis, which has occurred over the life of these mature small firms. In-depth analysis of seven cases is a powerful tool to capture the evolution of these firms and to examine the relevance of the results of this study.

The seven cases were chosen for three reasons: 1) their representativeness of the three parent samples; 2) their diverse characteristics (e.g. sector, age, size etc); and 3) the level of organisational change that occurred over their lives. The profiles are denoted A, B,...through to G. Four of these cases (A, B, C and D) were chosen from the Leverhulme (1985-1988) sample, as qualitative evidence is available on these firms early in their lives, see Reid (1993) and Reid *et al.* (1993). A service-based company was chosen from the Telephone survey 1991, as this sample was mainly comprised of services based firms, see Reid, (1996). Two further cases, a corporate design firm and a soft furnishings producer, F and G respectively, were chosen from the Leverhulme (1994-1997) sample (see Reid and Smith, 2000a; Reid, 1999; Smith, 1997a).

To illustrate the diversity of the seven enterprise profiles, Table 5.1 presents summary data on the age, product, SIC code classification, legal status, size (as measured by FTEs, turnover and assets), level of firm-specific turbulence and performance measured by the subjective measure of long run performance. It is difficult to class small firms as purely manufacturing or service firms based on Standard Industrial Classification (SIC) codes. Most small firms operate across a range of classification codes. According to Table 5.1 enterprise profiles A and C are solely involved in manufacturing and B and F are solely service-based firms. The three cases D, E and G

generate turnover from manufacturing products and providing services. Long-lived small firms from the Leverhulme (1985-1988) and the Telephone Survey 1991 samples are more mature. In this subsample of seven enterprise profiles, firms originating from these parent samples are older. Case profile A, a manufacturer of plastic injection mouldings, from the Leverhulme (1985-1988) sample, is the oldest firm (at 41 years old) whereas enterprise profile G, a manufacturer of soft furnishings, from the Leverhulme (1994-1997) sample is thirteen years old, the youngest firm in this sub-sample. Most of the enterprises are private companies except for profiles B and G. Evidence suggests that most small firms change legal form from the sole proprietorship form, to the partnership and private limited company forms, over their lifetime, (*cf.* Reid, 1998; Freedman and Godwin, 1992). In terms of scale, as measured by full-time equivalent employees, profiles B and C are the smallest firms in this subsample with 10 FTEs whereas firm F is the largest with 60 FTEs. With regard to turnover case profile D, the merchandiser of bulk bags, had the largest turnover (£4m stg.) whereas case profile G, the soft furnishings producer, had the smallest turnover at £224,000stg. at constant 2001 prices. The asset

Table 5.1: General Characteristics of the Enterprise Profiles.

Profile	Sample[b]	Age	SIC	Products	Legal Status	FTEs[a]	Turnover (£000stg.)	Assets (£000stg.)	Long Run Performance	Firm-Specific Turbulence
A	**LI**	**41**	**48**	**Plastic Injection Mouldings**	**Private Company**	**30**	**1700**	**1000**	**65**	**8**
B	**LI**	**23**	**61**	**Hospital Supplies**	**Partnership**	**10**	**1400**	**200**	**63**	**10**
C	**LI**	**24**	**47**	**Cardboard Packaging**	**Private Company**	**10**	**500**	**1000**	**72**	**13**
D	**LI**	**18**	**83 48 43**	**Merchants and manufacturers of bulk bags**	**Private Company**	**53**	**4000**	**900**	**67**	**10**
E	**Tel**	**23**	**66 41 83**	**Contract caterer**	**Private Company**	**60**	**600**	**150**	**70**	**15**
F	**LII**	**22**	**83**	**Corporate Design**	**Private Company**	**18**	**1000**	**80**	**61**	**12**
G	**LII**	**13**	**43 49 67**	**Soft Furnishings**	**Sole trader**	**13**	**224**	**80**	**90**	**9**

Notes

[a] FTE is an abbreviation for full-time equivalent employees.

[b] 'LI' is an abbreviation for Leverhulme (1985-1988), 'Tel' is an abbreviation for Telephone Survey 1991 and 'LII' is an abbreviation for Leverhulme (1994-1997).

[c] Long run performance indicator is approximated by $\Sigma f_i/n$, where f_i is the self appraised score between 0-100 for each factor averaged overall factors 1 to n which were applicable.

[d] Firm-specific turbulence is calculated by a count of main changes over life of long-lived small firm = ΣX_i, where X_i is the occurrence of a change i.

base is low primarily for service-based firms (B, D, E, and F) whereas it is high for manufacturers (A, C, and G). Much of the asset base of the service firms is perhaps intangible (e.g. goodwill, human capital).

This sub-sample of enterprise profiles has undertaken a number of key organisational changes over the life of their firms. Firm-specific turbulence ranges from a level of eight (i.e. the average in the entire sample) for case profiles A to a level of fifteen for case profile E. Thus, this sub-sample has undergone a lot of change over their lives, either to survive or to grow on their business. The flexibility of these small firms in responding to organisational change is examined (see Chapter 8). Further, the applicability of a real options line of reasoning (Bowman and Hurry, 1993; McGrath, 1997, 1999; Luehrman, 1997, 1998) in adjusting to signs of organisational change can be investigated for the three most important organisational changes instigated by each of these enterprise profiles. It is hypothesised in Volume I, Chapter 8 that the entrepreneur can raise the flexibility of the small firm and thereby enhance the long run prospects of the small firm by adopting such an approach.

High performers and low performers according to the long run performance score are represented in the sample. This indicator of performance ranges from a below average score of 61 for case profile F to an above average score of 90 for case profile G. Relative performance based on this subjective measure of performance can be compared to other objective measures of performance. The underlying determinants of the subjective measure of performance for each enterprise profile can also be examined. This should provide information on the factors, which foster the survival of the long-lived small firms in the sample.

Each enterprise profile is presented using a common approach to enable rich case-by-case analysis. The evidence is grouped into five analytical categories, namely, characteristics of the market, performance, internal organisation, organisational change and end games for comparative purposes. The analytical categories where chosen to illustrate key aspects of the quantitative results found in Parts IV-V in Volume I. The qualitative data available lends itself to an analysis of certain features of the quantitative results. Changes in the scale of the firm over its life, as measured by FTEs and turnover and a ratio of these measures, labour productivity, are examined to illuminate the results

obtained from the estimation of Gibrat's model in Chapter 5. General characteristics of the firm's market, its competitive strategy and its internal organisation create a picture of the long-lived small firm in a similar manner to the quantitative results presented in Chapters 5 and 7 in Volume I. They also capture some of the findings of Volume I, Chapter 9, which presents evidence on simultaneities between size, performance and these variables. As mentioned above, the performance of the long-lived small firm approximated using the objective measures and the subjective measure of performance is discussed conveying the points, which were raised in Chapter 6. Key organisational change undertaken by the firm over its life is examined to illustrate the results of Chapter 8. We focus on the level of firm-specific turbulence experienced by these firms over their life, their flexibility in making organisational change and the applicability of real options logic in analysing the adjustment process. Finally, end-games are examined to illustrate the process of 'passing of the baton' in family firms or features of other end-games such as a trade-sale or management buyout. This illuminates the description of end-games presented in Chapter 7, Volume I. Proceeding now to examine each of the enterprise profiles in turn.

Profile A: Processing of Rubber and Plastics

Enterprise profile A manufactured plastic injection mouldings on a bespoke basis since it was established in 1960. This private company was managed by two brothers at the time of interview. At this point, firm A was 41 years old. The brothers took over the running of the business from their father, its founder, in 1974. The two generations (i.e. father and sons) were employed in the business for approximately ten years prior to 1974. In 1964, the eldest son entered the business and in 1967, the youngest son joined the firm. Idiosyncratic knowledge on the operation of this business was transferred from father to son over this period. It is presumed that the interests of the two sons and their father, who founded the business, were aligned before the business was transferred or the 'baton was passed' to the sons.

The chief aim of the business at inception was growth rather than an overriding concern for profitability. Growth was traded off for increased profitability, according to the owner-managers. It is observable from Table 5.2, that turnover rose considerably in

real terms (constant 2001 prices) over the first ten years of trading. Turnover more than doubled while the headcount of the firm increased marginally, thus labour productivity rose considerably. By 1985 (after 25 years of trading) real turnover had dropped considerably (so also had the headcount of firm A and labour productivity in real terms). This had turned upward by 1988 though never achieving the levels of real turnover generated in 1970 (£7million stg. in constant 2001 prices).

The business, according to the owner-managers, had reach a long run equilibrium level of employment and turnover of 36 fulltime equivalent employees and £2.2 million (in constant 2001 prices) in sales respectively, after twenty-eight years of trading. In the year of interview firm A earned turnover of £1.7 million (in constant 2001 prices) with 30 FTE employees (see Table 7.2). Firm A's labour productivity had declined slightly, from £61,111stg turnover per FTE at 28 years, to £56,667stg turnover per FTE in 2001, the year of interview. A reduction in the market rate of growth (or value of) sales is a potential reason for this decline in labour productivity. Firm A adjusted its headcount downwards in size an effort to maintain labour productivity but it perhaps needs to downsize further to attain higher levels of efficiency.

Table 5.2: Scale of Profile A

Year	Turnover (£000stg) (£000stg 2001)	FTEs	Labour Productivity (£000stg/FTE) (£000stg 2001/FTE)	Assets (£000stg) (£000stg 2001)
At start-up (1960)	350 3,514	40	9 89	1 14
After 5years (1965)	500 5,849	46	11 127	-
After 10 years (1970)	750 7,015	42	18 167	-
After 25 years (1985)	480 879	26	18 34	112 205
Maturity (after 28 years)	1,200 2,198	36	33 61	254 412
After 41 years (2001)	1,700	30	57	1,000

Firm A was principally involved in manufacturing. It produced plastic injection mouldings to customer specifications. The products produced were very large in number because they varied by colour, size, finish of plastic etc. These products could be grouped into seven similar types of products (increased from three in 1985), namely shower curtain rings, curtain pole rings, brackets, finials, carry handles, plastic tumblers, custom mouldings and shower tray waste outlets. The three principal product groups were carry handles (12% of sales in 2001), curtain pole finials (12% of sales in 2001) and curtain rings (9% of sales in 2001).

Market Characteristics

At start-up firm A served customers in the Scottish market. By the time of interview the firm had extended its market reach and now focused on the UK market. Firm A also supplies particular products to international markets. The firm competes head-to-head with rivals in the UK market. In this market, it has four major and three minor rivals. The number of major rivals has not changed overtime but significant growth occurred in the number of minor or fringe competitors. In the principal market for carry handles firm A has a 25% share of the market. This has developed considerably since inception.

Competition was described as strong but weak in some aspects. The owner-managers' feel that the business is "*now there to be shot at*" or a target for new entrants. Entry was easy in the mid-eighties as capital requirements were low. According to one of the brothers, "*air machines were cheaply bought and could be operated in a garage*". Newer machines are much more expensive. Thus, high capital requirements represent a significant barrier to entry in the current market. The business is not capacity constrained. In response to substantial increases in demand the firm A could lease more machines.

The products of firm A and the competitive offerings of its rivals are similar. Though some buyers in the trade were highly expert, technical differences between the firm's products and those of its rivals were thought to be too small for customers to notice. Firm A has not differentiated its products from technical standpoint overtime. In the early years of trading products were differentiated by offering customers aid in designing their product, for example, by providing colours of the season or alternative

finishes to the plastic. However, at the time of interview firm A mainly competed on two dimensions namely, price and delivery. The products are now standard and are sold at low prices. Product differentiation is achieved by managing its inventory and by providing quick delivery of goods to customers.

As a consequence, Firm A typically supplies customers at the low end of the market (i.e. standard products at a low price). Firm A moved into this market position slowly and according to the owner-managers they are now *"a market leader"* in this position. The products are not niche based. This explains firm A's narrow competitive strategy space and wider market extent. Firm A's is also relatively larger size as measured by FTEs and turnover, in comparison with other mature small firms in the sample. Highly differentiated products are valuable in niche markets. Smaller firms survive in these markets because they do not attract competition from larger rivals. However, firm A is competing against larger rivals in a wider market (i.e. supplying national and international markets) using a less differentiated strategy and is thus larger in size.

Performance

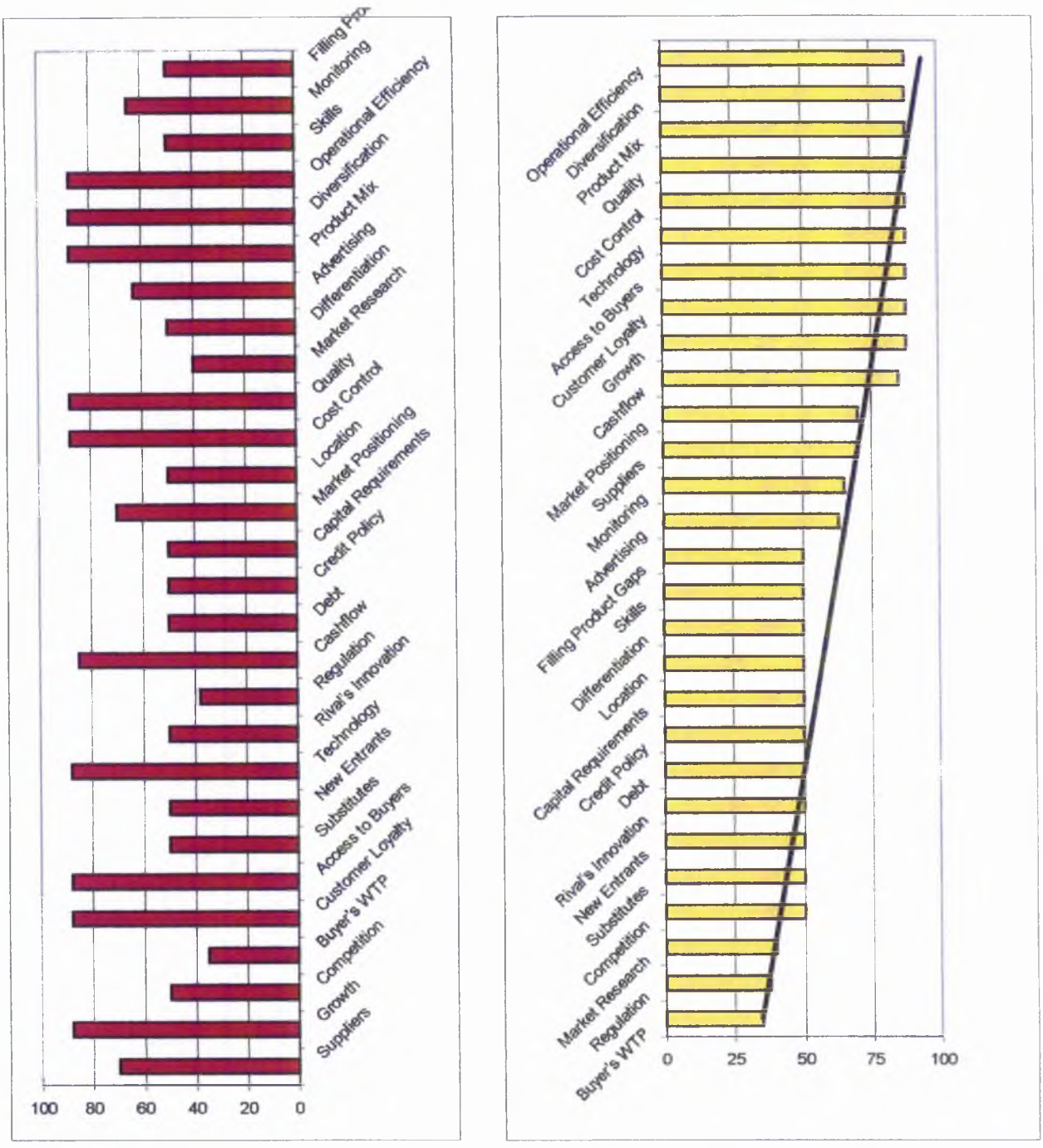
At the time of the interview, firm A made £150,000stg in profits (a rate of profitability of 15%, measured by net profits per pound of assets). The firm was set up on a shoestring 41 years ago. The start-up capital was £1,000stg (£14,058stg. in constant 2001 prices). Assets grew seventy fold over the life of the firm and are now one million pounds sterling (see Table 5.2). In absolute terms, this asset base is relatively large given that more than half the long-lived small firms in the sample had assets of less than £150,000stg. It represents a significant wealth enhancing effect for this family firm and for the local economy as a whole.

To finance the start-up of the business the founder mainly used private equity (see Reid, 1993). The gearing ratio of the firm was close to zero at start-up. It borrowed some funds from the bank and used hire purchase agreements but the firm did not rely on this source of finance. Over time increasing debt was considered to expand the premises and plant and equipment of the firm. The hiring of new employees and increasing inventory was also considered. This was guaranteed using life policies and heritable securities. At the time of interview, firm A had retired all its debt. It was financed solely

by family equity. This suggests a clear preference for sources of financing that minimise intrusion into the business.

Figure 5.1 presents the performance ratings of the owner-managers of firm A for each item on the multi-dimensional scale. An understanding of the attributes, which underlie performance, increases our knowledge of influences on firm A's long run survival. Attributes which received a rating above 75 included growth, customer loyalty, access to buyers, technology, cashflow, cost control, quality, product/service mix, diversification and operational efficiency. These are the primary determinants of firm A's performance. The owner-managers juggle these items in pursuing its high volume low cost strategy. These items reflect four of the five constructs underlying firm performance that is internal organisation, business strategy, industry structure and rivalry and the nature of buyers and suppliers. Attributes which received a rating below 50, included market research, buyer's willingness to pay and regulation. These factors negatively influence the long-run performance of firm A. Eleven items received a neutral rating. These included environmental items (i.e. rival's innovation, new entrants, substitutes, competition) and financial items (i.e. debt, capital requirements, credit policy).

The rating of the attributes shows learning by firm A's of its drivers of long run performance. These are linked not only to the financials of the business but also its core strategy. The owner-managers stated that their operational efficiency primarily fostered their survival. In their words, "*To be able to run the machines 24 hours a day, seven days a week, gives it the edge in output and cost efficiency*". The product mix of firm A was identified next. Firm A created a portfolio of products with different underlying demand features. As the demand for one product dipped firm A could concentrate on others for which demand was rising. The flexibility to change products overtime ensured their survival. According to the one of the brothers, "*They lost main customers every few years so they then changed their product mix*". Customer loyalty was also identified as important. Loyal customers are firm A's bread and butter business. Mail shots gained the firm two customers which ordered goods from the firm ever since. Even if these do not represent the top-buying customers, they are constant source of income and cashflow.



Overall Score 65

Figure 5.1: Subjective Performance Ratings for Profile A

This indicator of the long run prospects of the firm provides some structure to the juggling act, which these owner-managers undertake on a daily basis to achieve or maintain performance standards in order to survive. The overall score received by firm A for was 65, which was slightly below the average of 67. By way of comparison with objective measures of performance Firm A achieved a higher level of absolute net profits than the average in the sample of £39,971stg., a lower level of asset growth than the average of 210 times and a lower rate of profitability than the average in the sample of 33%.

Internal Organisation

At start-up the administrative organisation of firm A was highly evolved. It engaged in eight functional activities at inception including financial accounting, training of personnel, production, sales, market research, product maintenance, strategic planning and innovation. This was above the average in the sample of five functional activities. This was perhaps a function of the relative large initial start-up size of 40 full-time equivalent employees, which afforded a greater division of labour. The administrative organisation did not evolve largely over time. Firm A engaged in one further activity. The administrative organisation was extended with the advent of PCs. Computers were used in production and administration from 1986 onwards.

The owner-managers of firm A stated that the firm was innovative at inception through engaging in new marketing techniques. Over its life firm A developed approximately eight new products, which enabled it to raise its profits and to grow market share. To gain these rewards Firm A needed to exploit the innovations quickly in the market. The firm also made important process innovations over its life modifying many of its processes in major ways. These process innovations were chiefly derived from within the firm. The firm's rivals engage in a similar level of process innovation. This places the firm under some competitive pressure from time to time to become more efficient.

The business uses nine forms of information technology, which is above the average in the sample of 7.17 forms. The most advanced of these include: e-mail, website, internet access and electronic databases. The owner-managers believed that these were important to the business. They had infiltrated many of the daily routines of

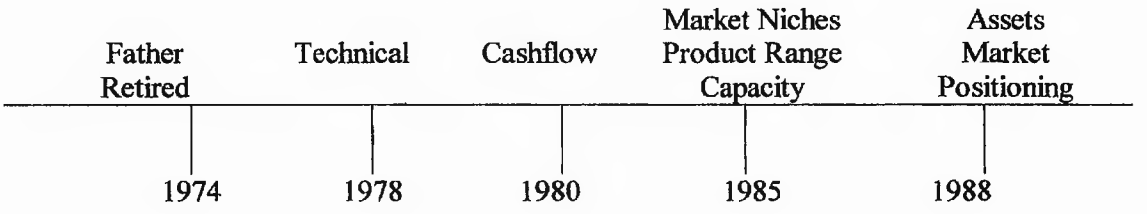
the business including planning, monitoring performance, improving operational efficiency, market research, administration and managing dealings with buyers and suppliers.

The industry experienced a lot of technical change over the life of firm A. This was initiated by newly emerging innovators in the industry. Generally firm A was successful in implementing new technologies.

Organisational Change

Firm A undertook eight main changes over its life, which is on par with the average level of firm-specific turbulence in the sample of long-lived small firms. These are illustrated on the firm's A lifeline presented in Figure 5.2. The timing of some changes clustered. For example changes in market niches, product ranges and capacity occurred at the same time (i.e. these changes are perhaps related). The asset base changed at the same time as firm A changed its market positioning (i.e. firm A had to invest in new expensive machines to become a low cost leader). There was a lot of change in the operations of the firm in the mid to late eighties when real turnover fell considerably. Having overcome this period of turbulence firm A has maintained a steady course. From the changes listed in Figure 5.2 the owner-managers viewed changes in the product range, assets and cashflow as crucial. These pivotal points are described in turn below in order of importance.

Figure 5.2: Key Organisational Change of Firm A



The product range of firm A changed in 1985 as the existing ranges became old fashioned. The company started from a plumbing business and initially manufactured shower curtain rings from plastic injection mouldings. However, it was recognised in the mid-eighties that this product range was unlikely to sustain the long-run survival of the

business. In the early eighties, demand for existing product ranges was declining. Sales were growing, but at a diminishing rate, despite increasing investments in marketing to increase sales and prolong the life of these product lines. Firm A monitored demand and used these investments in marketing to test whether the decline in the demand for shower curtain rings and other product offerings was just a temporary phenomenon. However, the fall in demand continued. The size of the market declined further as the number of firms competing in this market grew. The products of rivals were becoming more fashionable. Firm A had to choose between continuing to produce product ranges for which the market was declining, and becoming increasingly competitive, or to change product ranges in line with tastes.

Firm A had watched these precipitating influences of change unfold over a two-year period. To survive in the market place it decided in 1985 to change its product range. The brothers decided to change their strategy and compete on costs with new products. Early investments were made in marketing the new products to assess demand and to increase sales. Demand increased following entry into new market niches offering new products at low price. To offer the products at lower cost, they needed to increase the operational efficiency of the production process. However, they waited before making any irreversible investments of this nature. Two years later profitability rose. At this juncture, firm A invested in new technology to raise the marginal productivity of the capital and labour employed by the business. By staging the consequential adjustments, firm A minimised its investment until uncertainties were resolved. This raised its option value to withdraw at minimal cost if this new niche failed to show profitability. By adopting a 'wait and see' approach firm A was able to revise its strategy as circumstances unfolded.

The exercise of the real option to change firm A's product range set in motion another chain of options. Firm A invested in the asset base of the business through purchasing expensive new technology capable of producing large volumes of output at low cost. Firm A consciously tried to maintain a technological advantage over its rivals, in terms of its machinery and equipment. The asset base changed in minor ways between 1974 and 1988 as the firm altered its production from low to high volume batches. In this period, firm A purchased second hand equipment to upgrade its existing technology from

firms which were closing down. However, in 1988 a significant investment was made in new technology.

The precipitating influences of this change were similar to those mentioned above, with respect to the changes in product range. Two years prior to investing in the new technology, firm A was aware that it would need to invest in this new machinery to raise profits. One year prior to investing in the new machinery firm A's turnover was growing and demand had increased after the pursuit of a high volume low cost strategy. Any uncertainties, which firm A had perceived with respect to trends in demand and tastes, were resolved. However, to capture any further growth in demand firm A needed to increase operational efficiency and control costs.

Firm A exercised the real option to purchase the new machinery. They installed new machines, which were more controllable, required less maintenance and were more reliable. All the machines were logged onto a monitoring system. Once these new machines were installed firm A's costs fell and profitability increased instantly (i.e. zero months). Firm A exploited the growth in demand as its capacity to produce large volumes cheaply had increased. Firm A was much more operationally efficient.

A year after the installation of the new machinery, firm A had grown the business as much as it could naturally and set out to increase production by investing more heavily in marketing. The initial investment in new machinery provided firm A with two further options: 1) to increase capacity further (i.e. by growing the business), 2) to achieve higher levels of operational efficiency. The production of higher volumes would lead to further cost reductions (i.e. economies of scale). These consequential adjustments were staged also. Firm A initially captured whatever growth or demand was present in existing markets to achieve higher volumes and immediate changes in costs and profitability. Sub-sequentially to grow on the business firm A invested in marketing. This enabled firm A to maximise economies of scale and to sustain a low cost advantage. These actions showed the firm's commitment to its high volume low cost strategy. By staging commitments to high volume low cost strategy firm A increased its option to withdraw or to continue to invest.

The third most important organisational change, or pivotal point, identified by firm A, was a change in cashflow management in 1980. Following the introduction of the first

generation of automatic machines in 1978, firm A was producing larger volumes of stocks and supplying customers with larger batches of goods. Although sales had radically increased, the cashflow of the business was unchanged. By filling additional, or larger volume, customer orders, the profits of the firm A rose. However, the firm was cash constrained, as higher cashflow was needed to finance the extra throughput. The credit policy of the firm was not adequate. Creditors now owed them substantial sums of money. The extension of credit is an important source of differentiation when firms are competing on costs. Firm A did not want to risk losing new customers. It was able to withstand the increased burdens on cashflow for two years using private equity or retained earnings. In this time it built up relationships with these new customers and created other forms of switching costs. Thereby influencing the uncertainty and risk in its own environment. After this point, firm A tightened its credit policy slowly such that customers were not aware of an immediate tightening of this service. This improved the management cashflow. However, it was a temporary measure, which increased the operational efficiency of firm A. Three and a half years later firm A raised external finance. Firm A altered its credit policy initially rather than raising external finance. A change in credit policy is a tactical decision, which can be revised easily as opposed to external forms of finance such as invoice discounting or factoring. Thus, it offered the firm A greater flexibility.

The owner-managers proceeded cautiously in instigating organisational change testing changes in demand for new product ranges and staging adjustments to organisational change. The flexibility of Firm A in responding to environmental change is captured by the measures in Table 5.3. It seems that the firm A was not agile in responding to precipitating causes of changes in product range, with an average agility score of 0.57 (<1). The absolute number of consequential adjustments was higher than the number of precipitators. Agility was less than the average for the sample of 0.87. Certainly, firm A adopted a 'wait and see' approach before instigating organisational change and in instigating the 'consequential adjustments'. Average precipitator time and average adjustment time was larger for firm A than the average for all firms in the sample. Firm A engaged in planned investments once uncertainties were resolved. It

monitors contingencies in its environment and uses marketing experiments to analyse demand. This approach is consistent with a real options approach.

Table 5.3: The Flexibility of Firm A

Change	Number of Precipitating factors	Precipitating Time (months)	Number of Consequential Adjustments	Adjustment Time (months)	Agility	Speed
Product Range	4	24	8	24	0.5	48
Assets	5	24	9	18	0.55	42
Cashflow	3	12	4	42	0.75	54
Average	4	20	7	24.7	0.57	48
All Firms	5	16	7	17	0.87	22

End Game

The brothers do expect the business to continue to trade into the future. However, they are unsure what the end game strategy will be at this stage. They stated, "*either a family member would take over the running of the business or the firm will be sold*". They envisaged that they would continue to run the firm in its current stance for another seven years. Family succession from the second generation to the third generation is likely but not definite (see Beckhard and Dyer, 1983). The business has met the expectations of the owner-managers. They stated that their father was "*interested in developing a business for the family*". This was certainly achieved. Another source of satisfaction was control over generating their means of earning a living.

Profile B: Hospital Supplies

Enterprise Profile B wholesale distributes specialist medical products to General Practitioners, hospitals, case operating theatres (e.g. nebulisers), mothers (e.g. baby monitors, thermometers etc.) and home carers (e.g. body fat meters, blood pressure meters etc.). Firm B was launched onto an unsuspecting N.H.S. hospital supplies market in 1978 by a husband and wife team. Almost one generation (twenty-three years) later, the husband and wife team (or partnership) were considering potential end games for firm B, after an initial unsuccessful attempt to transfer the daily operation of the business to their daughter.

The husband and wife team set out to create a business with survival prospects. They envisaged that the business would be bigger than it was at the time of interview, but along the same lines. The level of turnover increased over the life of the firm in nominal terms but less so in real terms. After trading for eight years, the partners believed that the business had reached a long run equilibrium level of employment and turnover with 16 fulltime equivalent employees and £1.7 million stg. of turnover, (at constant 2001 prices), respectively (see Table 5.4). At the time of interview, firm B generated sales of £1.4 million stg. (constant 2001 prices) with 10 FTEs, £140,000stg in turnover per FTE. By adjusting its headcount downwards firm B raised the labour productivity of the firm considerably to levels much higher than typical values (£64,427stg. per FTE) in the sample of long-lived small firms. Adopting this strategy enabled firm B to achieve higher levels of performance at this mature stage in its lifecycle and perhaps increase the relative human capital of the workforce of firm B. Assets were accumulated over the first seven years of trading. After this point their value at approximately £200,000 sterling (constant 2001 prices) was maintained.

Table 5.4: Scale of Profile B

Year	Turnover (£000stg) (£000stg 2001)	FTEs	Labour Productivity (£000stg/FTE) (£000stg 2001/FTE)	Assets (£000stg) (£000stg 2001)
At start-up (1978)	190 659	2	95 330	12 38
After 5years (1983)	600 1224	16	38 76	
After 7 years (1985)	430 exc. VAT 788	14	31 56	100 183
Maturity (after 7.5 years)	1,000 1,771	16	63 111	
After 10 years (1988)	1,000 1,621	12	83 135	
After 23 years (2001)	1,400	10	140	200

Principally, firm B engaged in the wholesale distribution of specialist medical products. In 1985, 80% of sales were generated in medical wholesaling, 15% in surgical instrument servicing and 5% in research and development. The firm supplied

approximately 15 product groups, (e.g. filtration products, nebulisers etc.). In 1988 the business abandoned instruments servicing and shifted to new products. At the time of interview firm B's product line was more focussed. The firm generated 100% of its sales from medical wholesaling. The two principal product groups were critical case services (90% of sales) and nebulisers (10% of sales). The firm normally sells medical supplies in bundles. It bundles similar products together and sells them at a bundled price.

Market Characteristics

Firm B has served the Scottish market since inception. The market reach of firm B is constrained to thirty delivery points, which has consequences for growth and capacity expansion. Normally firm B operates at fifty percent of this capacity. The firm competes head-to-head with six major and six minor rivals in a niche market (i.e. a contested niche market). The number of major rivals has fallen considerably overtime. Successful players (including firm B) in the competitive battle between rivals have grown in size. The number of fringe competitors, or minor rivals, has remained more or less constant overtime.

Firm B has a small share of approximately 2.5% of its principal market but in some market niches its market share is as high as 20%. Given that the firm is a niche player, the business is protected largely from fierce competition. With fewer players in this market competitive tactics are now less corrupt. Firm B lost some business in the past due to the predatory pricing tactics adopted by firms, which have now exited the market. However, as this market niche is still contested the owner-managers of firm B described competition in this niche market as intense in every aspect. The niche is perhaps subject to hit and run competition.

The products of the firm and those of its rivals are different. The purchasers of the products are fairly expert about the product and draw on personal experience as well as technical information available in specialist publications, trade journals etc. The owner-managers claimed that their products were, and have always been, 'better' than those of rivals.

Firm B sells products typically to customers at the middle of the market (i.e. medium quality products at a medium price). At inception, the firm concentrated on the top end of the market (i.e. premium products at premium prices). Once the employees of

firm B had acquired an adequate level of technical knowledge on the primary benefits of the products supplied they began to serve the needs of customers in the middle of the market. Firm B competes on four dimensions (just below the average of 4.5 methods), namely price, quality, after sales service and delivery. It therefore competes in a niche market with a mildly differentiated competitive strategy. This perhaps explains the fact that it is slightly below average in size (13.5 FTEs) for a long-lived small firm.

Performance

Firm B earned £1,000stg in profits (a rate of profitability of 0.5%, measured by net profits per pound of assets) in the last trading year. This was low in comparison with previous years. Normally, the firm earns approximately £65,000 in profits (a rate of profitability of 33%). This indicates the level of variation, which can exist in calibrating long-run performance using rate of profitability as a measure of performance. The book value of assets grew four-fold since inception. This represents growth in the tangible asset base but does not take intangible assets into account, which could be sizeable in a service-based firm, like firm B. Firm B's premises are located in a major urban centre. This represents the main physical asset of the firm.

At start-up firm B had difficulties establishing the idea that a market existed for the services it supplies and also in producing financial statements for the proposed business (e.g. cashflow statements). To finance the start-up of the business the founders borrowed funds from the bank guaranteed using personal guarantees and heritable securities. The gearing ratio of the firm was 40 (12,000/300) at inception. Over the life of the firm, increasing debt was considered to expand the premises, the plant and equipment of the firm or to increase inventory levels. In the early years of its operation, firm B experienced cashflow difficulties as a result of delinquent debtors, over-investment, inadequate credit policy and insufficient overdraft facilities. At the time of interview, firm B had two forms of debt, a bank overdraft and invoice discounting to the value of £100,000stg. Other than debt finance the firm is financed by private equity. Firm B has not sourced any outside equity finance.

Figure 5.3 presents the owner-managers' performance ratings for each scale item on the multi-dimensional scale. Attributes which received a rating above 75 included suppliers, access to buyers, technology, quality, diversification and skills. Thus, the key

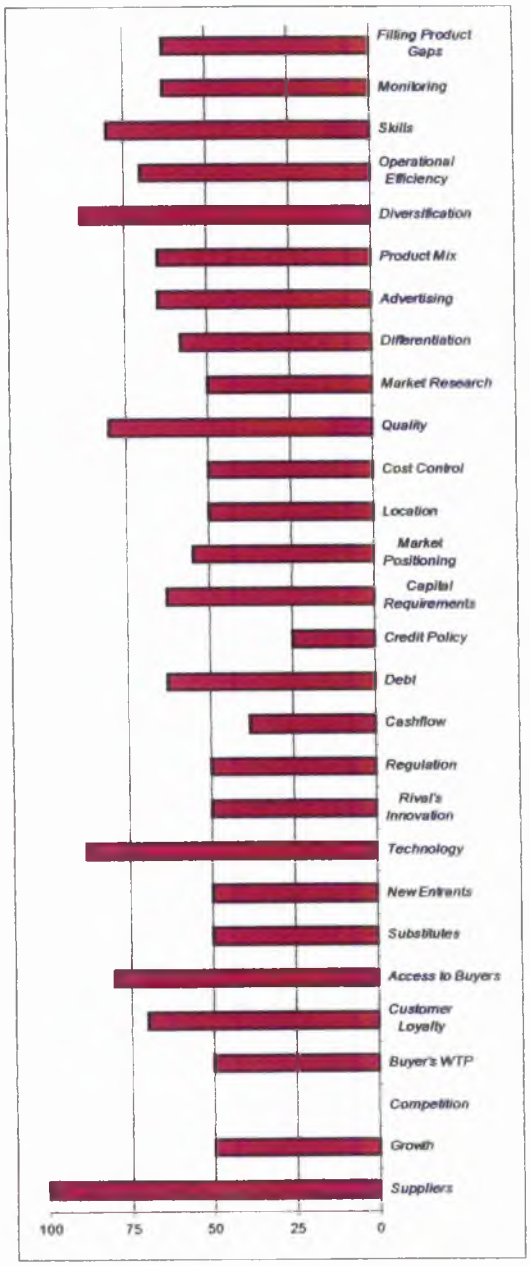
determinants of its performance are its suppliers, channel access, product quality, product range, knowledge and technology. Attributes, which received a rating below 50, included cashflow, credit policy and competition. These aspects reduce the small firms performance. Characteristics of this mature small firm's environment received "neutral" ratings (=50) (e.g. rival's innovation, substitutes, new entrants, regulation etc.). These did not pose a significant threat to the long run prospects of the small firm.

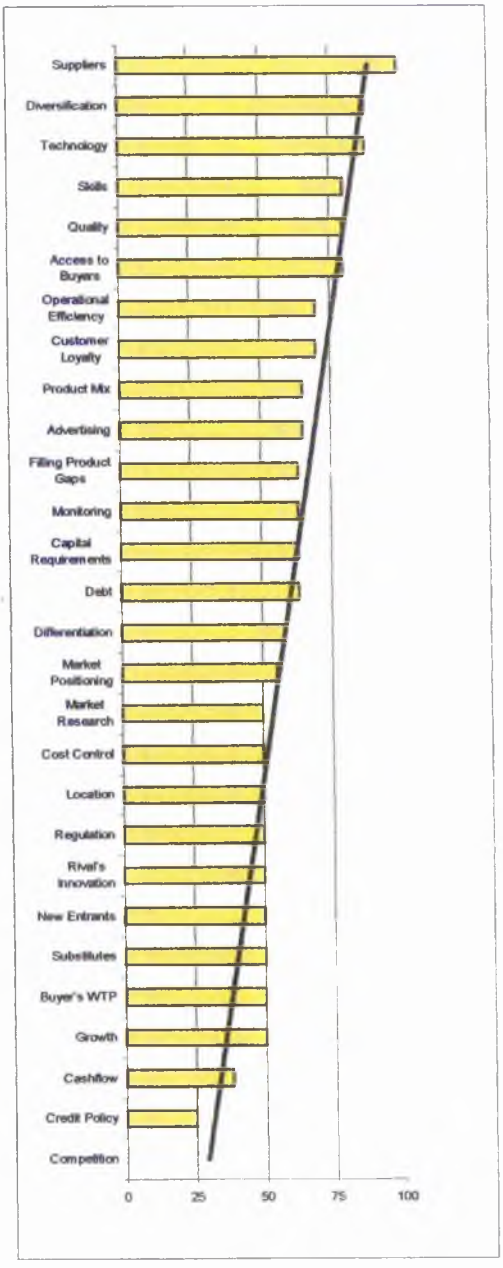
In commenting on firm B's long run performance, the husband and wife team stated that their suppliers primarily fostered their survival. The suppliers of firm B identified product ranges and brands for distribution. These products met customer's needs and were superior to the competitor's product offerings. Channel access was next in importance. In the words of the owner-managers, "*to be able to see whom you want*" is vital to the growth and survival of their business. Gaining channel access was becoming more difficult in firm B's market place. A diversified portfolio of products was important. To survive in firm B's market small firms must demonstrate a willingness to change products and learn about new products rapidly.

The overall score received by the firm was 63, which was below the average of 67. By way of comparison with objective measures of performance firm B achieved a lower level of absolute net profits than the average in the sample of £39,971stg. in the last trading year, a lower level of asset growth than the average of 210 times and a lower rate of profitability than the average in the sample of 33%. The owner-managers did state that the level of profits earned in the last trading year was atypical and normally the firm have a rate of profitability of about 33% equivalent to the average firm in the sample.

According to the owner-managers, the business largely met their expectations. They expressed some reservations because they "*had hoped to be much larger, perhaps two or three times larger*". The struggle to survive was a source of constraint on further growth.

Figure 5.3: Subjective Performance Ratings for Profile B





Overall Score: 63

Internal Organisation

For a business with few employees at start-up the internal organisation of this firm was highly evolved. The firm performed nine activities internally, namely financial accounting, training of personnel, production, sales, market research, product maintenance, strategic planning, legal matters and innovation. This was well above the average of five activities performed internally at inception by the typical long-lived small firm in the sample. Few extensions were made to the administrative organisation of the firm as it grew in size. Computers were used in administration from 1987 onwards. The firm made significant investments in the training of staff. According to the owner-managers investing in the human capital of the firm is very important to its survival. Long-standing employees complement the firm.

At inception, Firm B was innovative, supplying a diversified portfolio of products. Firm B launched more than twenty new products since start-up. The firm experienced some difficulties in launching new products. Reliance on sales representatives was the weakest point of the business. Their interests were not aligned with the interests of the owner-managers. Rivals were also engaged in product innovation and this placed significant competitive pressure on the firm. Patents, copyrights, trademarks aided in the protection of product innovations in the wholesale distribution of medical supplies. Technical knowledge of the benefits of new product was also invaluable. The rapid exploitation of new product innovations was required. Firm B also made significant process innovations, modifying a few of their processes in major ways. These process innovations were initiated within the firm.

The business uses eleven forms of information technology above the average of 7.17 forms in the sample of long-lived small firms. The most sophisticated of these include: e-mail, website, internet access, digital cameras and electronic databases. These were perceived as very important to the business of firm B. Information technology is used in the performance of a number of routines within the firm including planning, monitoring performance, improving operational efficiency, market research, designing new products, administration and managing dealings with buyers and suppliers. Firm B was one of the first firms in the market to use a website in distributing medical supplies.

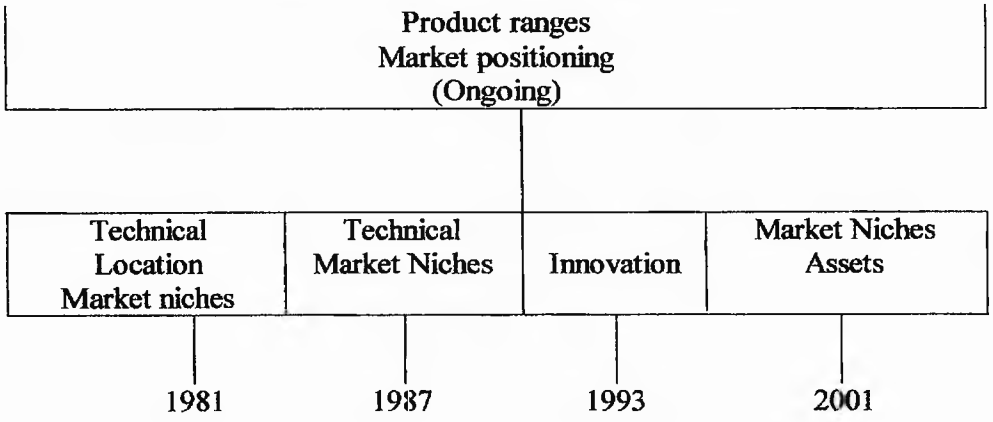
Firm B's products are grouped together in centres (GP, hospital, home care, baby etc.) for distribution via the web.

The medical supplies industry experienced a lot of technical change over the life of the firm. Suppliers normally initiate this technical change. Generally, firm B was successful in implementing new technologies.

Organisational Change

Firm B experienced ten main changes over its life, above the average level of firm-specific turbulence of eight in the sample of mature small firms. Figure 5.4 illustrates the types and timing of key organisational changes on a lifeline for firm B. Changes in firm B's product ranges and its market positioning were ongoing throughout the life of the firm. Further, the timing of changes in the technical side of the business and in the market niches served by firm B seem to bunch together. Out of the main changes listed, the owner-managers viewed changes in the market niches served, and product ranges supplied, as crucial. These are described below in order of importance.

Figure 5.4: Key Organisational of Firm B



A major change in the market niches served by the Firm B occurred in 1987. A rival company entered firm B's market with identical product groups. This was the chief precipitating influence of change. Firm B recognised its limitations. This rival had more resources to serve customers in their niche. The owner-managers of firm B in analysing the scenario decided to withdraw from this market niche and exercise the option to

reposition its product offerings to serve the needs of customers in the top end of the market. Following this the firm achieved further growth.

Changes in product ranges of firm B were undertaken continuously throughout its life, but this did not negate the importance of this form of change. For example, between 1997 and 1998 the firm started to supply new product offerings. Firm B became the exclusive dealer for a main line of filters. Furthermore, firm B launched a new line of surgical gloves. The owner managers stated, "*We went in cold and it worked*". This generated £300,000stg. worth of new business with a rate of profitability of eighteen percent. Profitability is the primary precipitating influence of change in product range. Firm B is alert to opportunities to introduce profitable lines. After instigating a change in product range consequential adjustments normally follow in growth, entry into further new niches, profitability, sales and cash-flow. According to the owner managers, they will develop a new product range again this year.

Firm B needs to be speedy in responding to new opportunities in the market. The precipitating and adjustment time is a matter of months, on average approximately 4 and 4.5 months, respectively. Alertness to opportunities to introduce new product lines which customers desire is also important. Firm B takes action after identifying just one precipitating influence of change rather than adopting 'a wait and see' strategy. High quality real time information is important to assess the affect of undertaking a specific change in product range or entry into a new market niche. While resolving uncertainties is valuable, the short precipitator time suggests that the quick introduction of new product lines is necessary to gain improvements in performance. If new opportunities or options are ripe they should be exercised immediately. The agility of firm B is low, average of $0.29 < 1$. This is because the absolute number of adjustments is high relative to the number of precipitators, which are few in number. In comparison with the average number of adjustments in the sample of long-lived small firms, Firm B makes fewer consequential adjustments. Thus, the level of irreversible investments is low. Firm B undertakes consequential adjustments speedily. This quick reaction time and low level of irreversible commitments offers firm B greater flexibility to revise its strategy if required.

Table 5.5: Flexibility Measures for Profile B

Change	Number of Precipitating Influences	Precipitating Time	Number of Consequential Adjustments	Adjustment Time	Agility	Speed
Market Niches	1	2	2	6	0.5	8
Product Range	1	6	5	3	0.2	9
Average	1	4	3.5	4.5	0.29	8.5
All Firms	5	16	7	17	0.87	22

End Game

On their retirement, the husband and wife team wished to transfer the business onto the next generation, their daughter. To ease the passing of the baton their daughter took over the running of the business for a trial period of one year. Unfortunately, during this year sales slumped. This took the founders by surprise. They had not catered for, or thought, about this eventuality. According to the owner-managers, "*their daughter did not have the personality for clinching sales deals*". As a consequence, the founders have ruled out family succession. The owner-managers were sceptical about the viability of a trade-sale as an end game. The significant asset of the business was intangible (i.e. the goodwill of the business). At the time of the interview, the owner-managers did not believe that a market existed for the goodwill of the business. One potential strategy they were considering involved the sale of the physical assets of business (i.e. the site and premises).

Another possibility is an employee buyout of firm B. The owner-managers believed that some of the employees of the firm were competent to operate firm B. This option was successful in the past. At maturity (in 1986) firm B divested of its surgical autoclaving and maintenance activities. This section of the business was acquired through a low cost buyout by members of the workforce of the firm (a very competent manager of that unit). This manager switched the focus of this business (repairing medical equipment and sterilising them) towards developing countries where there was a market for these services. Given the success of the previous buyout, this is possibly a feasible option. The owner-managers of firm B had a strong community ethos and belief

in supporting enterprises in the local economy. From their viewpoint, this would be the preferred route.

Profile C: Bespoke Cardboard Packaging

Enterprise profile C is a manufacturer of bespoke corrugated cardboard packaging. The firm produces small batches of cardboard packaging to customer specifications rather than high volumes. The founder of this enterprise liked to think that they were problem solvers, designing new forms of packaging to meet specialist needs. He was a trained engineer, with a postgraduate degree and previous corporate experience. He established this private company, twenty-four years earlier (nearly one generation), in 1977. Since then, the founder set up two new businesses (i.e. a business portfolio) producing coasters and learning aids using cardboard (e.g. sundial's, numeracy aids).

The owner-manager founded this business as an alternative to unemployment rather than with an overriding concern for the rate of profitability of the firm. At the time, the owner-manager was thinking more about feeding and educating his family rather than any other concerns. Typically, in the small firm's literature this would be regarded as a negative motive for setting up a business (Storey, 1994). The long run survival of firm C does not lend support to this argument. Small firm survival is linked to more pecuniary motives such as growth and rate of return (see Reid and Smith, 2000a). The high level of education of the founder may have had a role to play. The entrepreneur envisaged the business as providing a better service than anyone else. According to the entrepreneur, the firm would trade with integrity; never advertise or look for business. The owner-manager wanted to build a reputable firm. Other than this the founder had no formal plan for the business.

At the time of interview, the founder's son (i.e. the second generation), was also employed by firm C, as an owner-manager. Firm C was believed to be mature. Turnover grew tenfold in nominal terms over the first ten years of trading while the level of employment doubled. After fifteen years of trading (in 1992), the firm had reached a long run equilibrium employment level of 14 fulltime equivalent employees and a long run equilibrium level of turnover of £751,000stg. at constant 2001 prices (see Table 5.6). At the time of interview, firm C employed 10 full-time equivalent employees and

generated turnover of £500,000stg. (constant 2001 prices). Firm C maintained labour productivity or the level of turnover generated per FTE since 1992 at about £50,000stg. (constant 2001 prices) however the headcount of the business was reduced from 14 FTEs to 10 FTEs over this period (see Table 5.6). Thus, it seems firm C is reducing its headcount to maintain a certain level labour productivity or performance (see Volume I Chapter 9).

The total number of products produced was large as they were manufactured to customer specifications and therefore varied by size, colour, finish etc. These products could be grouped into thirty similar types of products (increased from 3 in 1985). The three principal product groups were 0201s[1] (34% of sales), palent pads (23% of sales), and dye cuts (15% of sales). Even though dye cuts represent a small percentage of sales this product group generates eighty percent of firm C's added value.

Table 5.6: Scale of Profile C

Year	Turnover (£000stg) (£000stg 2001)	FTEs	Labour Productivity (£000stg/FTE) (£000stg 2001/FTE)	Assets (£000stg) (£000stg 2001)
At start-up (1977)	50 188	6.5*	8 29	50 188
After 5years (1982)	250 533	10	25 53	
After 8 years (1985)	250 412	8.5	29 48	300 550
After 10 years (1987)	500 850	12	42 71	
After 11 years (1988)	360 584	12	30 49	175 284
Maturity (1992)	600 751	14	43 54	
After 24 years (2001)	500	10	50	1,000

*lots of causal labour at start-up e.g. students etc.

[1] Rectangular slotted container

Market Characteristics

Firm C serves a niche market, which is largely not contested except by four fringe competitors. It supplies bespoke cardboard packaging to customers within an urban region of Scotland. Though its market reach has not changed largely since inception, it was perhaps more local earlier in the life of the firm. Firm C's share of the world market for bespoke cardboard packaging is tiny (under 1%), but in its principal market firm C's share is much higher, as there are no other suppliers of particular products groups. As the niche is largely uncontested, competition was described as generally weak but strong in some aspects. One dimension, on which competition intensity has increased slightly since inception, is price.

Firm C is capacity constrained. The business normally operates at about two-thirds (65%) of this capacity. The owner-manager was concerned about the level of excess capacity in the corrugated cardboard packaging industry. He explained, "*The level of excess capacity in manufacturing in general was precipitating the level of excess capacity in the industry*" (i.e. fewer goods to be boxed). Globalisation is also affecting firm C as more and more potential manufacturers of products, which demand cardboard packaging are now locating in Japan, USA, Germany. The packaging of the products of these manufacturers is no longer undertaken in the United Kingdom, as it is not practical to do so. The size of the market for cardboard packaging is being eroded as a result. The growth in the plastics industry, a substitute for cardboard packaging, is a further contributor to the decline in market size. Most firms in the industry are facing a threat from substitutes, except German producers, where the cardboard manufacturers prevented the producers of plastic packaging from entering their market and eroding their market share.

The products produced by firm C are similar to the products of other players in the bespoke cardboard packaging market. According to the founder of firm C, their designs are superior in comparison with competitor's product offerings. Firm C employs the founder's skills in engineering, to generate designs, to satisfy the needs of clients. The customer is not technically minded per se, but may have in mind a few technical features that the product should have. The designs have become more sophisticated over time. The founder and employees of firm C accumulated experience in the design of their

product through creating alternative cardboard packaging solutions for customers. This represents a significant entry barrier.

Firm C sells products typically to customers "*at the top end of a commodity market*", a phrase coined by the entrepreneur (i.e. the firm sells high quality products at a high price). Price is not an issue in this market segment. Customers are insensitive to price changes. According to the founder, the cost of being out of stock is the customer's greatest fear. The owner manager stated, "*A £10,000 instrument can be in a box worth a few quid which reduces price sensitivity*". Most of the customer's goods are over-specified. In this niche market, firm C competes based on five dimensions; quality, volume, after-sales service, new product development and delivery. This is just above the average of 4.5 dimensions in the sample of long-lived small firms. Most of their business is generated from referrals. The firm has repositioned its product offerings since inception. At start-up firm C served customers at the bottom of the market, selling mainly flat pack cardboard packaging. Competition was intense in this market and consequently firm C began to establish a reputation for producing more premium forms of cardboard packaging. Firm C aimed to deliver greater value to their clientele. Firm C has not grown largely in size since start-up. It does not compete with the large players. Instead it is has cultivated a niche market by differentiating its product offering and selling this within a narrow geographic market in Scotland.

Performance

Firm C reported a loss of £22,500stg (i.e. a rate of profitability of -2%) in the last trading year. This was below the average rate of profitability firm C reported in 1985 of 25%. The rate of profitability reported in 1985 was perhaps over-stated, as this rate was much higher than the net profits per pound of net assets recorded by firm C at the time. In 1985 assets worth £300,000stg earned £25,000stg in profits, a rate of profitability of 8.3%. This illustrates the difficulties in obtaining accurate self-reported net profit figures in interviews with small firms.

Assets were accumulated gradually in the early years of trading. At the time of interview, assets were valued at five (5.31) times their value in real terms at inception (£188,000stg.). The asset base of the firm at the time of interview was £1 million stg., which is considerable relative to half of the sample, which had an asset base of less than

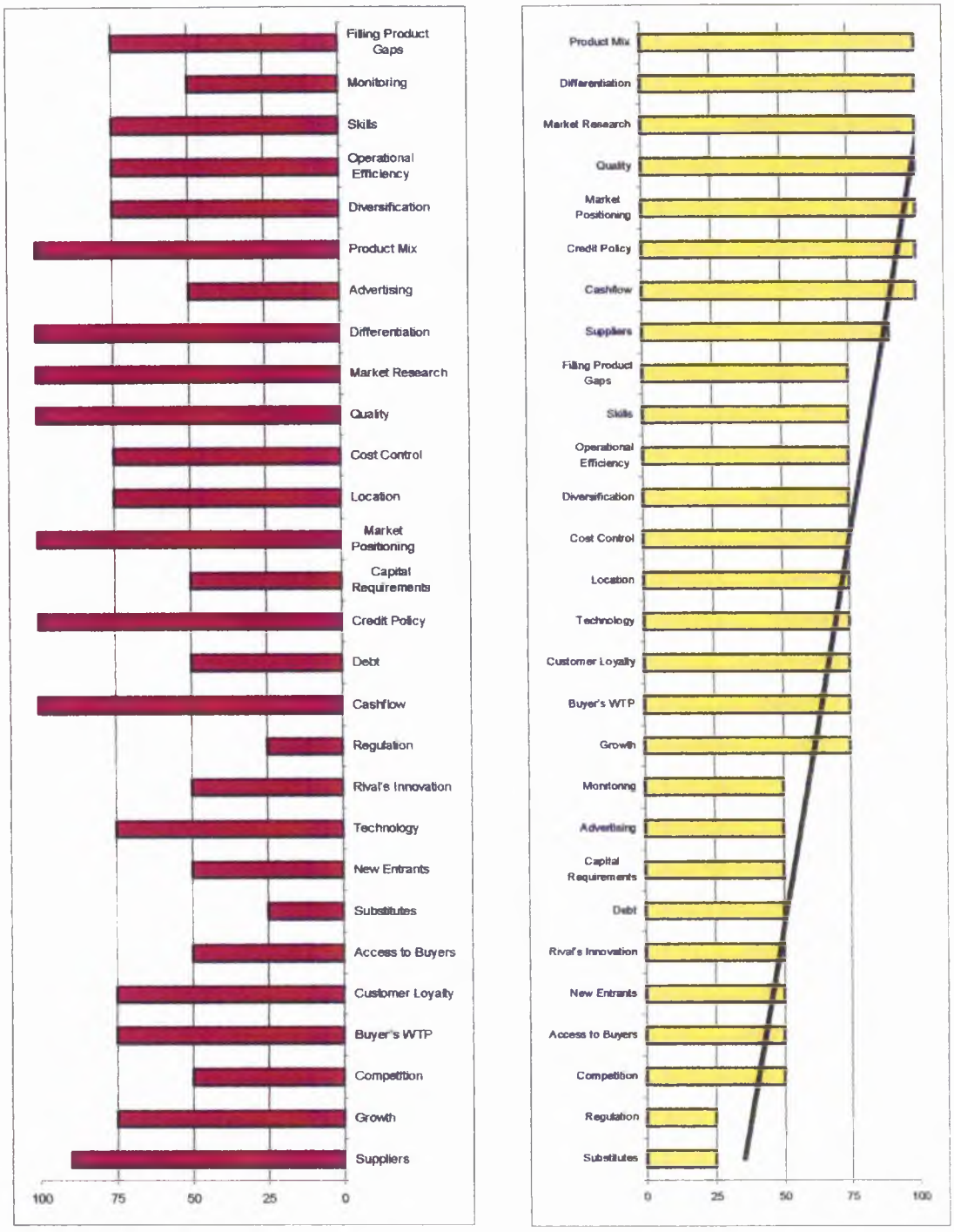
£150,000stg. The personal wealth of the founder and his family had grown significantly through engaging in entrepreneurial activities.

Firm C was financed at start-up by external finance and personal equity. The funds loaned from the bank were guaranteed using personal guarantees, life policies and floating charges. Firm C retired debt in the first ten years of trading. At the time of interview, it had no form of debt. It was solely financed from private equity, suggesting a clear preference for this form of finance.

Figure 5.5 presents the performance ratings of the owner-managers of firm C for each item on the multi-dimensional scale. Attributes which received a rating above 75 included suppliers, cashflow, credit policy, market positioning, quality, market research, differentiation and product mix. As observable from Figure 5.5, a number of attributes received a rating of 75 such as skills and filling product gaps, operational efficiency and location etc. Firm C juggles these scale items to survive in the long run. The items, which received a performance rating $\geq$ 75 reflect the underlying determinants of the added value generated by firm C.

Attributes, which received a rating of less than 50, were few in number but included substitutes and regulation. The founder did express concern about the threat posed by plastic packaging to the long-term viability of the cardboard packaging industries. Other aspects of the small firms market environment received neutral ratings (e.g new entrants, access to buyers, competition etc.) and did not pose a large threat to the long run prospects of firm C.

The owner-managers stated that the quality of their products and service plus their reliability and integrity as producers primarily fostered their survival. The overall long run performance score received by the firm C was 72, which was above the average of 67 for the sample of long-lived small firms. Therefore, firm C was a high performing firm according to the long-run performance indicator. This is less evident from an examination of the objective measures of performance above, particularly the rate of profitability. The asset base grew five fold, which is lower than the average of 210 times for the sample of long-lived small firms. However in terms of monetary value (£1m stg.) its assets are significantly higher than that of over half the sample. This firm started with



Overall Score: 72

Figure 5.5: Subjective Performance Rating for Profile C

a much larger asset base of £188,000stg. at constant 2001 prices. The latter is perhaps an indicator of superior performance.

Internal Organisation

At inception, seven functions namely, financial accounting, training of personnel, production, sales, market research, product maintenance and strategic planning were all performed internally. This highly evolved administrative organisation did not change largely. In 1980 the firm engaged in product design and innovation, that is, at 3 years of age. Similar to the rest of its cohort of mature small firms, firm C began to use computers in production and administration nine years after inception (in 1986).

The primary innovation of the small firm was the entrepreneurial event. At inception, the founder launched a cardboard packaging company, which supplied relatively higher quality products than were available in the market at the time. From then on firm C engaged in near to market innovations (i.e. customised cardboard packaging designs). The founder stated that firm C failed to capture an adequate level of rewards from its product innovations. Firm C was still waiting to capture these. Given excess capacity in the congrugated cardboard industry, to survive firm C needs to develop new products using its machinery and equipment. This has led firm C to set up two new businesses using the existing inputs and machinery. As it happens, Firm C's reputation as a design house places competitive pressure on competitors in the industry. The design innovations for firm C are protected using copyright.

Most of firm C's innovative efforts concentrate on features of the product design rather than on process innovations. Suggestions from employees of firm C lead the firm to modify a few of their processes in minor ways. According to the owner manager, the firm *"builds on other people's ideas"*.

Information technology is now an important resource of the business and is used, specifically, in improving operational efficiency, the design of new products, and administration. Firm C uses seven forms of information technology. The most advanced of these include: e-mail, internet access, electronic databases and computer aided design. Even though information technology is important in speeding up the design and production of new products, older production methods are also important. According to the owner-manager, the use of information technology may not be the best method, as

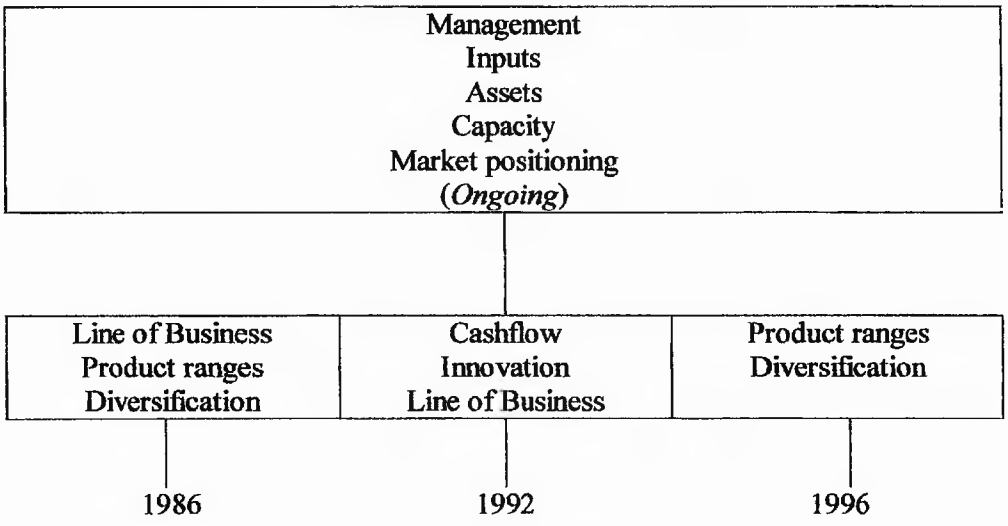
sense of touch is also important. He recognises the advantages, but also the limitations of this technology.

The congrugated cardboard packaging industry experienced a lot of technical change over the life of firm C. Newly emerging innovators from Germany, Japan and USA are constantly improving the machinery used for production in this industry. Generally, the firm has been successful in implementing these technologies.

Organisational Change

Firm C made thirteen key organisational changes in its operations since inception, which is higher than the average level of firm-specific turbulence (of eight key changes) experienced by long-lived small firms in the sample. This firm is perhaps chopping and changing to grow the firm as long run performance is a convex function of firm-specific turbulence. The forms of key organisational changes and the timing of these changes are illustrated in Figure 5.6. Out of these main changes the owner-managers viewed changes in product innovation, line of business and diversification as vital. These are described in order of importance below.

Figure 5.6: Key Organisational Changes of Firm C



Product innovation by firm C took many different forms. Alterations were made in the materials used in manufacturing and design of product. For example, the founders developed new types of presentation boxes, which used dyed cardboard boxes. These innovations were near to the market. The innovations were precipitated by the

emergence of new niches and customers demanding different types of packaging. According to the founder "*Demand is required before new innovation takes place... Clientele come to the factory with the item to be boxed and the firm designs a box which fits.*" Firm C was required to design solutions promptly. The intellect of the entrepreneur in the early years of trading, and in recent years the intellect of his son, drove new designs. With backgrounds in engineering, the founder and his son both have an extra interest in improving the design of the product.

In the early years, firm C designed products without the use of information technology. When the founder realised that firm C was highly regarded as a design house he invested in a computer aided design system (CAD) to increase the speed of design. A "wait and see" strategy was adopted before making irreversible commitments in new technology. As a result of the investment in computer aided design technologies the operational efficiency of firm C increased. New designs were copyright protected and they generated a lot of extra sales through referrals.

Firm C initiated change in its line of business in 1986. This was precipitated by a decline in the size of the market. Traditionally, firm C served the needs of smaller customers. However, the turnover from this source decreased because a new policy of single sourcing blocked channel access. As a result of this change in policy, smaller customers were supplied through one of the major dealers. These major dealers sourced products from firm C. Orders fell from these major dealers. Excess capacity precipitated the owners to produce new product lines. The founder and his son had the intellect and knowledge of the machinery to adopt the equipment and materials to produce different types of product lines (e.g. coasters). New opportunities were emerging to produce different types of products using cardboard. This was demand induced. The products were produced to customer specification. This process began one month prior to the change in business line. Following this diversification of the product portfolio the firm's sales increased and its mix of customers changed. After one year, the firm began to invest in different types of machinery to produce these new product lines. Thus, firm C only made irreversible commitments in machinery until they had establish that a demand existed for these new products.

Firm C desired to grow and make increasing use of the capacity of the firm. The founder was aware for about ten years prior to developing related businesses that the potential was there (i.e. new niches were emerging), but firm C had not exercised this option in the past. To optimise the use of capacity, firm C exercised the option to diversify. The value of waiting was at its lowest so the timing was ripe to exercise the option. Two new companies were founded to produce products such as numerical learning aids and sundials etc. These new products are related to existing products in that similar inputs are used in the production of these products (i.e. growth through related diversification). The son now manages firm C and the founder runs the new businesses. Since they started these new businesses the technology of the firm and their customer base has changed. These changes occurred over time. The firm is still waiting for expected increases in profitability.

Table 5.6: Flexibility Measures for Profile C

Change	**Number of Precipitating Factors**	**Precipitating Time**	**Number of Consequential Adjustments**	**Adjustment Time**	**Agility**	**Speed**
Innovation	3	18	4	12	0.75	30
Line of business	4	1	4	12	1	13
Diversification	4	120	4	12	1	132
Average	3	46	4	12	0.92	58
All Firms	5	16	7	17	0.87	22

Firm C was very agile in responding to precipitating influences of change (agility approximately equal to one) relative to other mature small firms in the sample. It held the option to diversify into related lines of business in its portfolio for a number of years (10 years) before initiating the right to exercise this option. Average precipitator time and speed are longer than average as a result. The average consequential adjustment time was much lower. Most consequential adjustments were immediate. Product solutions had to be found promptly. The firm waits, however, before making irreversible investments of in new technology and machinery until it is certain that there is sufficient demand for new product lines etc.

End Game

The founders son is now actively involved in the running of the business. This is one of the few cases in the sample, where family succession is certain. The business will be transferred to the second generation. The baton is being passed slowly from father to son. The son has a similar background in engineering as the founder. The son also has a relevant postgraduate degree (i.e. an MBA). The interest of the founder and his son are closely aligned and idiosyncratic knowledge in operating the business is being transferred at present on a daily basis.

Profile D: Merchants and Manufacturers of Bulk Bags

In its early years of trading, enterprise profile D solely manufactured bulk bags. However, at the time of interview, firm D was chiefly involved in merchandising the same product imported from manufacturers in Turkey and China. The variable costs of producing bulk bags at firm D's manufacturing facility were now much higher, than those of competitors located in East European and Asian countries (e.g. Turkey and China). Labour costs were much lower in these countries than in Scotland. Firm D was unable to compete with these rivals, thus it reduced its manufacturing facility considerably and switched to merchandising bulk bags. Sixty percent of sales are now generated from the merchant side of the business and forty percent from in-house manufacturing.

The entrepreneur founded this private company in 1984 and managed the firm until 1992. At this point, the founder retired from the business and two managers, employees of the firm D at the time, purchased a share of the firm and took over the daily running of the business. The founder participated in the operation of the business on an advisory capacity (as a director) until 1999, and is still a major shareholder in the business.

At a level of turnover of £4 million stg. the owner-managers believed that the business had reached a long run equilibrium value of sales. Even though the volume of sales has increased in recent years, turnover has plattooed. This is because the price per each unit has fallen, as a consequence of intense competition from producers in East European and Asian counties. In 1994, there was 93 fulltime equivalent employees in the firm producing £4.2 million in turnover (see Table 5.8) or £54,000 stg. (constant 2001 prices) turnover per FTE employee. At time of interview, 53 employees in the firm

produced £4 million stg. in turnover. Therefore labour productivity has risen considerably to £75,000 stg. per FTE employee. This is above the average level of labour productivity of £64,427stg. per FTE employee in the sample of long-lived small firms. Firm D adjusted its headcount downwards to reduce costs and to become more operationally efficient. As production is moved further eastwards, the number of FTEs employed by the firm should fall further, in an attempt to raise firm D's level of operational efficiency and its long run prospects.

Twenty varieties of bulk bags are produced and sold. The bulk bags are high performance woven polypropylene bags used for carrying heavy loads of powders and granules such as chemicals, minerals, fertilizers, grains and other bulkier products such as coal and potatoes. They are designed to hold large quantities from 500kg to 2,000kg. The designs of bags are standard. Thus, the product offering of East European and Asian producers and firm D are identical.

Table 5.8: Scale of Profile D

Year	Turnover (£000stg) (£000stg 2001)	FTEs	Labour Productivity (£000stg/FTE) (£000stg 2001/FTE)	Assets (£000stg) (£000stg 2001)
At start-up (1984)	175 340	10	18 34	5 10
After 1 years (1985)	200 366	29	7 13	50 92
After 4 years (1988)	1,600 2,594	57	28 46	385 624
After 5years (1989)	1,600 2,407	70	23 34	-
After 10 years (1994)	4,200 5,051	93	45 54	-
After 17 years (2001)	4,000	53	75	900

Market Characteristics

Firm D principally supplies bulk bags to the UK market, although an increasing proportion of its turnover is generated from the sale of bulk bags in international markets. Firm D is moving westwards, to North American and European markets, in the sale, and eastwards in the production, of bulk bags. Firm D competes head-to-head with rivals for

customers in these markets. Competition has become more intense over time. In the manufacture of bulk bags, there are 20 major competitors (increased by fifteen) in Europe and 35 minor competitors (increased by twenty). Similar numbers exist in merchandising bulk bags. Previously, competitors emphasised product quality, whereas price competition is now extremely intense. Within the European market, firm D has a market share of approximately fifteen percent, which has grown considerably since inception. This estimate is based on the firm D's knowledge of the market as a member of the European Flexible Intermediate Bulk Container Association.

Firm D argues that it is not capacity constrained. On the distribution side capacity is limited only by cost. Of course, in manufacturing firm D has a limited capacity. The production facility normally operates at one hundred percent of capacity. As stated above, the products of firm D and the offerings of its competitors are similar. Standard products are identical but firm D does service specialised customer needs if requested. The products have become more sophisticated over time. However, firm D's specialist products are becoming more standard. Competitors are now beginning to target firm D's niche market (e.g. small volume specialised orders). Customers of Firm D's products vary in their technical know-how from experts, who can determine by their own judgement the technical quality of the product, to the relatively uninformed customers who need guidance and information about the key technical features of the firm's product. Switching costs were generally high for customers with specialist needs.

Firm D supplies products typically to customers in the middle of the market (i.e. medium quality products at a medium price). It competes on eight dimensions in its principal market namely price, quality, after sales service, new product development, tying up suppliers, marketing, customer relations and delivery. This is well above the average of 4.5 dimensions in the sample of long-lived small firms. Thus firm D is trying to differentiate its service from that of competitors, particularly in specialist niche markets. It has adjusted downwards in size over time in servicing the needs of customers in this niche market.

Performance

At the time of interview, firm D had recorded net profits of £90,000stg in the last trading year (a rate of profitability of 10%). This level of profitability was lower than the

rate of 24% recorded in 1985. The book value of assets grew nearly ninety fold (89%) since inception. At a value of £900,000stg, asset accumulation by firm D was considerably higher than over half the mature small firms in the sample frame, which had a book value of assets less than £150,000. This augments the wealth of the founder and the current owner-mangers of the business.

To finance the start-up of firm D, the founder borrowed funds (£10,000stg. at constant 2001 prices) from the bank and the Scottish Development Agency. This funding was secured by floating charges (i.e. securities on plant equipment, stocks etc.). The gearing ratio of the firm was close to 0.5 in 1985 and 0 in 1988. Over the life of the firm, raising external finance was considered to expand the premises and the plant and equipment of firm D. The hiring of new employees and increasing inventory was also considered. At the time of interview, firm D had three forms debt, namely, a bank overdraft; a bank loan and hire purchase agreements (e.g. on vehicles). Firm D was also financed by outside equity finance. This represents 22% of total equity (i.e. the founders shareholding).

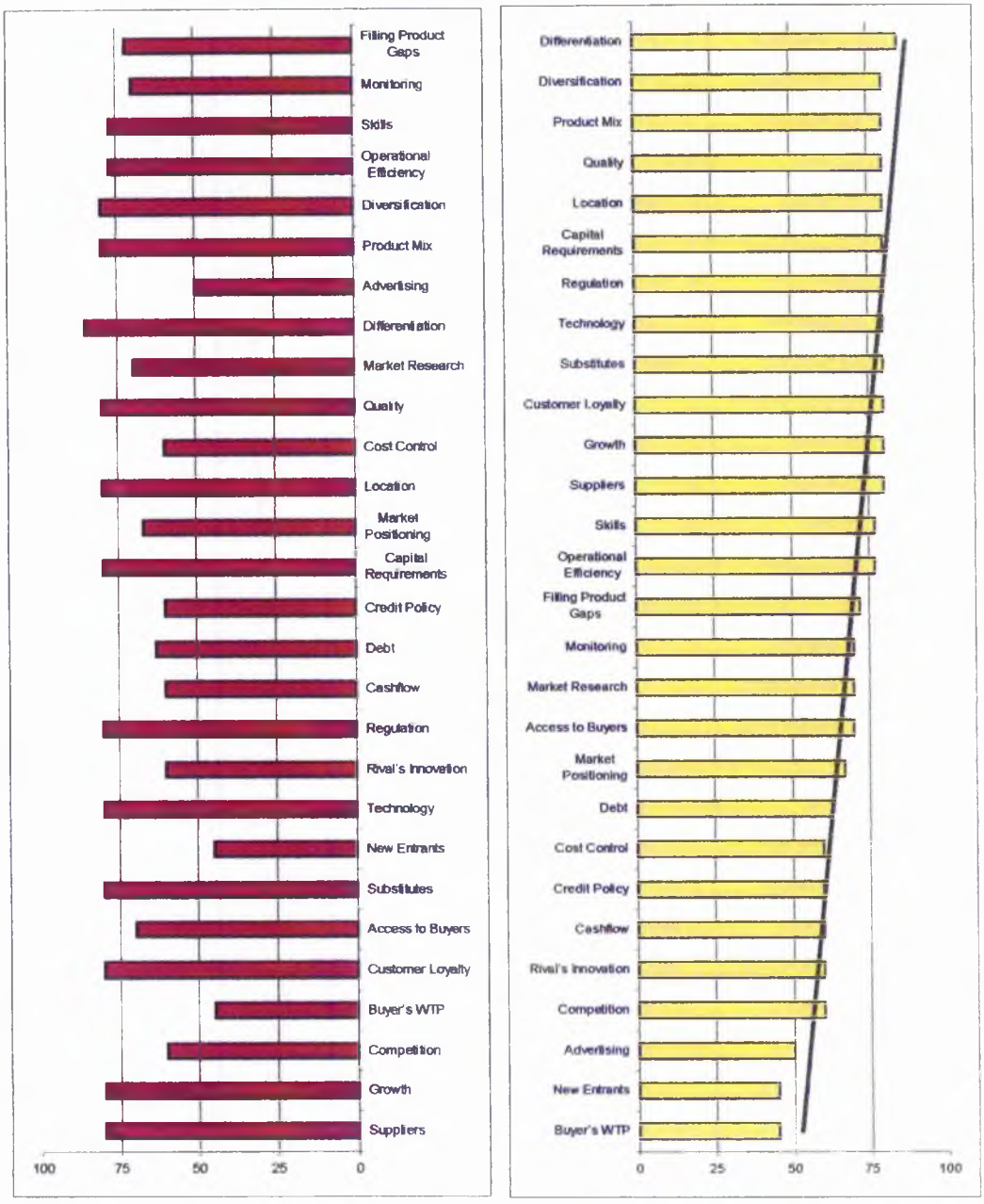
The performance ratings of owner-managers of firm D for each item on the multi-dimensional scale are presented in Figure 5.7. Attributes, which Firm D rated highly (ratings > 75) included suppliers, growth, customer loyalty, substitutes, regulation, technology, cashflow, capital requirements, location, quality, differentiation, product/service mix, diversification, skills and operational efficiency. Some environmental items such as regulation, substitutes, and technology received high ratings as opposed to neutral ratings. To compete in international markets these factors are perhaps more important determinants of small firm performance. Attributes, which received a rating below 50, included new entrants and buyer's willingness to pay (or "Buyers WTP") referring to the intense price competition in the industry and growth in the number of competitors.

In commenting on their performance ratings the owner-managers stated that the flexibility to diversify into merchandising, the continuation of the backup production facility (i.e. to improve coordination and minimise transactions costs) and the skills and knowledge to be able to control the quality of their suppliers service through on site visits

primarily fostered their survival (i.e. through monitoring and transfer of knowledge). Elements of this strategy are explained further below.

The overall score received by firm D was 67, equivalent to the average level of performance of long-lived small firms in the sample. By way of comparison with objective measures of performance, firm D achieved a higher level of absolute net profits than the average in the sample of £39,971stg. in the last trading year, a lower level of asset growth than the average of 210 times and a lower rate of profitability than the average in the sample of 33%. Its level of assets at £900,000 stg. are well above the average in the sample and its turnover grew eleven fold in real terms over the life of the firm to £4m stg. (also well above the average of £834,111 stg. in 2001). The latter shows signs of superior performance. It is difficult to form a clear judgement on the consistency of the objective and subjective measures of performance in this case.

Figure 5.7: Subjective Performance Rating for Profile D



Overall Score: 67

Internal Organisation

At inception eight functions were performed internally including accounting, staff training, production, sales, market research, product maintenance, strategic planning and innovation. This was above the average of five activities. Even at this early stage, the internal organisation of Firm D was highly evolved. With ten full-time equivalent employees working for the firm at inception, this perhaps facilitated a greater division of labour at this stage. The administrative organisation of the firm was extended in 1991 with the introduction of a catering facility, and in 1992, with the use of computers in production and administration. The relative importance of functional activities in firm D is evolving as the manufacturing facility is being downsized and the sales and distribution functions are being extended.

Firm D launched innovative products at inception. This entrepreneurial event was main innovative activity of the firm. Since start-up firm D developed approximately fifteen new products, which enabled the firm to raise its profitability and grow market share. Competitors engage in a little product innovation. At times, this places Firm D under intense competitive pressure to develop superior products and to become more efficient. Firm D made slight changes in the operation of the firm, modifying a few of their processes in minor ways. These process innovations chiefly were initiated by suggestions from customers. All their manufacturing facilities are accredited with ISO 9002 and firm D has its own in-house testing apparatus.

Firm D uses eight forms of information technology, just above the average of seven in the sample of long-lived small firms. The most advanced of these include: e-mail, internet access, website and PCs. Information technology is believed to be very important to firm D and is used in performing a number of functions within the firm including planning, monitoring performance, improving operational efficiency, market research, product design, administration and managing dealings with buyers and suppliers.

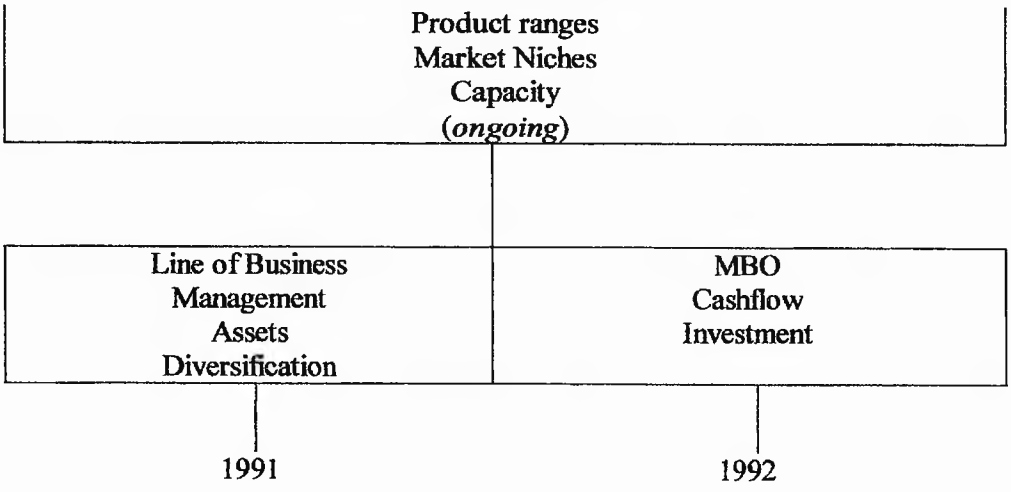
The industry has experienced a lot of technical change over the life of firm D. Acknowledged leaders in the industry initiated technical change. Generally, firm D has been successful in putting these technologies into operation.

Organisational Change

Firm D engaged in a lot of trimming of its activities over its life. On average firm D undertook ten key organisational changes, which is above the average level of firm-specific turbulence undertaken by long-lived small firms in the sample. From Volume I Chapter 8 we found that firm-specific turbulence is a convex function of performance. It seems that high performers are engaging in a lot of trimming to grow on the firm whereas low performers are chopping and changing just to survive. Firm D received an average performance score so it is perhaps chopping and changing to survive and perhaps achieve greater growth.

Figure 5.8 illustrates the types and timing of key organisational changes instigated by Firm D during its life (i.e. a lifeline). Most of the organisational changes occurred relatively earlier in the firm's lifecycle (in 1991) and following changes in ownership (in 1992). The key organisational changes clustered at this time except for ongoing changes in product ranges, market niches and capacity. Out of the main changes identified, changes in ownership, the asset base and the firm's line of business were thought to be of higher relative importance. These are described in turn below.

Figure 5.8: Key Organisational Changes of Firm D



The founder of firm D wished to exercise the option to withdraw from the business (i.e. semi-retirement). To exercise this option, the founder took a planned approach. He

began to develop the management skill base of firm D two years prior to retirement. He hired one manager two years prior to the management buyout (MBO) explicitly for this purpose. This manager joined the firm with the expressed intention to partake in the running and ownership of the business. The other manager worked in firm D for many years prior to the MBO. A management buyout was the preferred end game for the founder and for the personal development of the current management within firm D. The existing management had the skills to grow on the firm and the founder wanted to keep an "*oar in the business*" and did so up until 1999. If the management had not taken over the business, the founder believed that there would possibly have been an offer from a competitor.

The two managers who purchased shares in the business exercised a number of options to grow on the business. Increased profits were sacrificed initially for increased growth. The level of investment in firm D increased immediately. The new owner-managers increased the growth rate of firm D over the first three years of operation. Sales, inventory and cashflow increased. This was converted into higher profits five years later. At this stage, firm D had gained access to a range of new buyers. The owner-managers exercised cost controls reducing the headcount of firm D, raising relative productivity of capital through investments in new technology and increasing operational efficiency of production and sales techniques. As a result of intense competition in manufacturing, the new owner-managers exercised the option to enter the merchandising of bulk bags. The management style of firm D also changed. These adjustments were implemented over a five year period and some of them are ongoing.

In 1991 the opportunity arose to purchase firm D's premises, which was owned by the Scottish Development Agency. The agency were selling the factory outlets in the industrial estate in which firm D was located following a reorganisation of its operations. Only two businesses in the industrial estate purchased properties. The founder of the business purchased one of these properties. Firm D had the necessary finance to purchase the property. It was viewed as an investment, which would also increase the value of the business (e.g. a nest egg on retirement). The ability to control its own rental payments was also an important precipitator of this key organisational change. A loan was obtained from the bank to purchase the premises. Part of this property was rented

out to two other businesses on the date of purchase. Two years following the purchase these set of tenants vacated the property. This provided firm D with a lot of additional capacity and offered it the option to use this additional capacity to store inventory etc.

A change in firm D's line of business (i.e. from manufacturing to distribution) was precipitated by increased competition. As explained earlier, the market for bulk bags became very price competitive as new entrants in Eastern Europe and Asia could produce identical products at a significantly lower price (i.e. they had lower labour costs). Firm D recognised that a real option to wholesale distribute bulk bags manufactured by producers in Eastern Europe and Asia existed. Opportunities for further growth in sales were present in this segment of the market. Increased profits could be achieved through acting as an intermediary between these East European and Asian producers and customers in Europe and North America. The customers of firm D do not want to deal with firms in China directly and are willing to pay for the services of an intermediary. Firm D exercised the option to merchandise bulk bags and became sales agents for the low cost producers in the east. The firm satisfies the demand of customers by importing bulk bags cheaply and selling these to clients. The owner-managers were aware that if they hadn't exercised the option to enter the merchandising of bulk bags that there was an increasing risk that customers would switch to other low cost suppliers. As it happens, none of the firm's competitors in the U.K adopted a similar strategy. However, by providing this service firm D has a competitive advantage over its rivals, as it is able to offer bulk bags at very low cost.

On a phased basis firm D reduced its manufacturing facilities. By keeping some remnants of a manufacturing facility, firm D could cope with unforeseen contingencies such as delays in delivery etc. Further, through adopting a "wait and see" approach before divesting of its manufacturing facilities, the owner-managers were able to test the viability of engaging in merchandising. This increased firm D's options to withdraw from this segment. The owner-managers often visit manufacturers in China to assess the quality of their products and their manufacturing facilities. This resolves uncertainties (e.g. information asymmetries and opportunistic behaviour) about the quality of imported bags. Other consequential adjustments included a reduction in the headcount of the firm

as manufacturing was downsized. Firm D also gained access to a new mix of suppliers and customers. Sales, cash-flow and profitability rose.

Table 5.9: Flexibility Measures for Profile D

Change	Number of Precipitating factors	Precipitating Time (months)	Number of Consequential Adjustments	Adjustment Time (months)	Agility	Speed
Ownership	3	24	15	60	0.2	84
Assets	4	3	4	24	1	27
Line of Business	6	6	12	24	0.5	30
Average	4	11	10	36	0.42	47
All Firms	5	16	7	17	0.87	22

On average, firm D's agility score was less than 1 (0.42), implying that it had a low level of agility. The number of consequential adjustments was high relative to the number of precipitators for changes in ownership and in the line of business. Firm D acted quickly and responded with agility to the opportunity to purchase its premises. For the other key organisational changes firm D adopted a "wait and see" strategy staging its resource commitments until uncertainties were resolved and putting alternative solutions in place in case of unforeseen contingencies. This provided firm D with the flexibility to withdraw if required.

End Game

This enterprise profile demonstrates the varied end game strategies, which could be adopted transferring the business from one generation to the next, whether the baton is passed on within the family, or to existing managers, or to an outsider. Particularly, the MBO illustrates how the founder managed the transfer of ownership. Initially, the founder sought out a competent employee and recruited a manager to take over the daily operations of the business. To ensure the smooth transition of the baton to the managers, the founder continued to hold a stake in the business and stayed on as an advisor for seven years. At the time of interview, the two directors expected the business to continue to trade into the future. They were unsure what the end game strategy would be at this stage. Either a family member would take over the running of the business or the firm would be sold. The directors are quite young yet. One of their sons displayed some interest in running the business. He was employed in the business while at college. The

directors continue to run the business to increase its value on trade-sale. The business has met the expectations the owner-managers. So far they had seen a fair amount of growth and the possibilities for further growth are still there. Both directors still receive quite a bit of satisfaction from running the firm.

Profile E: Contract Caterer

Firm E was established in 1979 to provide contract-catering services. This private company started in a small way, catering for working lunches, but the entrepreneur sought to grow the company into a substantial business. At the time of interview, the scope of the firm E's clientele varied widely. Firm E provides the catering for corporate functions in local universities and financial firms. It supplies the catering for the crew of ships. The firm works in partnership with a local authority to serve the catering needs of the authority. Moreover, firm E provides catering services for private functions such as wedding banquets, buffets etc.

Firm E was 22 years old at the time of interview (almost one generation). It generated sales of £1,600,000stg. (constant 2001 prices) with 60 full time equivalent employees or £27,000stg. per full-time equivalent employee. Turnover increased in real terms over the life of the firm but the headcount of firm E increased also. Most of firm E's staff are hired on a part-time basis. This may explain the low level of labour productivity relative to other long-lived small firms in the sample. Firm E has eighty part-time employees and twenty full-time employees. In any case the low level of labour productivity suggests that firm E needs to adjust its headcount downwards to raise its performance.

The total number of products produced by firm E is large, as meals are cooked to customer specifications. These products could be grouped into six similar types of products namely, wines & spirits, service, bakery, hot plates, cold plates and desserts. Hot dishes and wines and spirits each represent approximately 30% of firm E's turnover. The remaining 40% comprises of the other product groupings.

Table 5.10: Scale of Profile E

Year	Sales (£000stg) (£000stg 2001)	FTEs	Labour Productivity (£000stg/FTE) (£000stg 2001/FTE)	Assets (£000stg) (£000stg 2001)
At start-up (1979)	25 76	1	25 76	0
After 5years (1984)	200 389	10	20 39	
After 10 years (1989)	1,000 1,504	45	22 33	
After 12 years (1991)	1,200 1,558	36	33 43	
After 22 years (2001)	1,600	60	27	150

Market Characteristics

Firm E principally provides catering services for customers in Britain although it has some clients in international markets. Firm E's market reach has increased significantly over time as it mainly served customers in local markets at inception. Firm E competes head-to-head with rivals in its principal market. Competition was described as strong but weak in some aspects yet its intensity has increased over time. Firm E has three major and hundreds of minor rivals. Two of the three major rivals are very large companies or "*the big guys*" in the words of the owner-manager.

The number of major players has fallen over time but the number of fringe competitors has remained unchanged. According to the owner-manager, one major rival, which exited the market, was top of the market between 1920 and 1970 and then lost popularity and was forced to exit the market (i.e. no longer trendy). As a result the owner-manager is aware of the precarious nature of his position in the market.

In the principal market for hot meals, firm E's market share is minuscule, under 1%. The market share of firm E grew considerably since inception, but is still very small. Firm E's capacity to grow market share is not constrained. The products of firm E and the product offerings of its rivals are different. The products have become more differentiated over time. Firm E sells products, typically, to customers at the top end of the market (i.e. high quality products at a premium price). In this up-market position firm E competes on six dimensions, namely, price, quality, new product development, delivery, marketing and long-term relations with competitors. This indicates that firm E

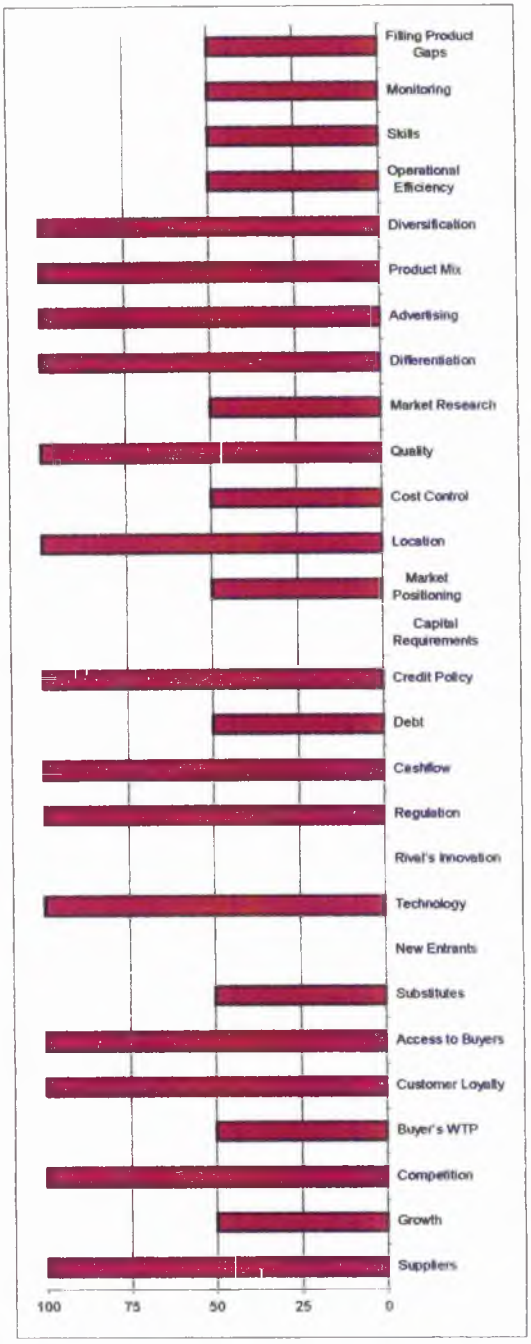
has a broad competitive strategy space. Firm E differentiates it service from the competitive offering of other firms in the market. The firm is cultivating a niche in the top end of the market. The strategy is labour intensive given the large headcount of Firm E.

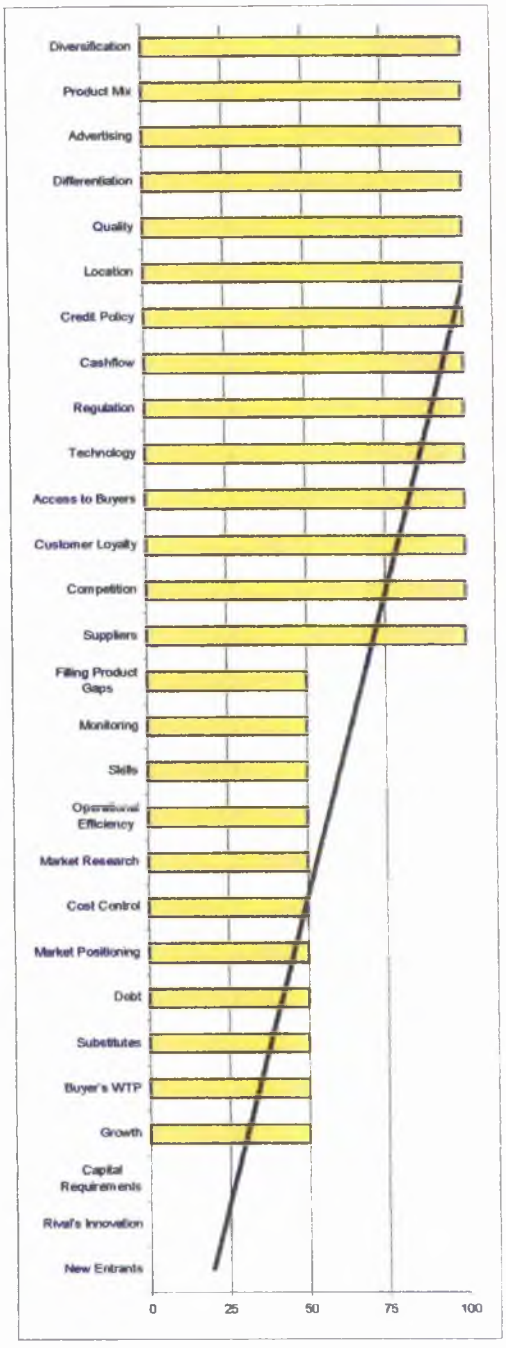
Performance

Firm E earned £35,000stg. in profits in the last trading year (a rate of profitability of 23%). This rate of profitability may be much lower if intangible assets were included in the denominator (i.e. in the book value of assets). Firm E has very few physical assets (£150,000stg.). The firm uses the premises of corporations and the homes of private individuals free of charge to supply its services. The firm's primary physical assets are the vehicles used for transporting the food. Firm E began with no physical assets thus the asset base grew one hundred and fifty thousand fold since inception. This solely represents growth in the tangible asset base rather than intangible assets, which could be sizeable for a service-based firm, like firm E where a lot of its business is generated through referrals.

At the time of interview firm E had two forms of debt namely, a bank overdraft and a bank loan. Greater indebtedness is negatively related to survival at inception, see Reid, (1991). However, later in the small firms lifecycle there can be a number of optimal forms of capital structure, see Reid (2003). Other than these two sources of finance, firm E is funded by private equity.

Figure 5.9 presents the performance ratings of the owner-manager of firm E for each item on the multi-dimensional scale. Attributes which have raised the long run prospects of firm E (rating>75) included suppliers, competition, customer loyalty, access to buyers, technology, regulation, cashflow, credit policy, location, quality,





Overall Score: 70

Figure 5.9: Subjective Performance rating for Profile E

product/service mix, differentiation, advertising and diversification. These are the attributes, which firm E juggles to survive in the industry. Most of the other scale items received a neutral rating except for capital requirements, new entrants and rival's innovation. These received a rating of zero and negatively influence the long run prospects of the small firm. In commenting on these ratings, the owner-manager stated that the quality of their service (which offers value for money), their reputation (ability to actually perform the service) and trust with employees primarily, fostered their survival.

The overall score received by the Firm E was 70, which is above the average of 67 in the sample of long-lived small firms. It is difficult to compare the long run performance score based on the owner-managers' self-appraisals with objective performance measures. Objective performance criteria do not account for the value of the intangible assets of the business. Whereas the tangible asset base (of £150,000stg.) has increased over the life of the firm, it is below the average absolute value of assets in the sample of £330,425. The rate of profitability of Firm E is also below the average rate of profitability in the sample of 33%.

Internal Organisation

Firm E began with a very simple administrative structure as a one-man outfit. The founder of the business performed the accounting, production and sales functions. The administrative structure evolved slowly over a four-year period. Product innovations in meals were ongoing since inception. In the second year of operations the owner-manager trained personnel. By the fourth year of trading, the simple structure had evolved and firm E engaged in three further activities, namely, market research, strategic planning and after sales service. At this stage, there were approximately ten full-time equivalent employees working in the firm which enabled a greater division of labour.

It was only six years ago that firm E used computers in the general administration of the business. However information technology is now used widely within the business. Firm E has seven forms of information technology, a similar number to that of the typical long-lived small firm in the sample. The most advanced of these include: e-mail and a website. The owner-manager perceives information technology as important. Firm E uses information technology in administration, planning, monitoring performance,

improving operational efficiency, market research and managing dealings with buyers and suppliers.

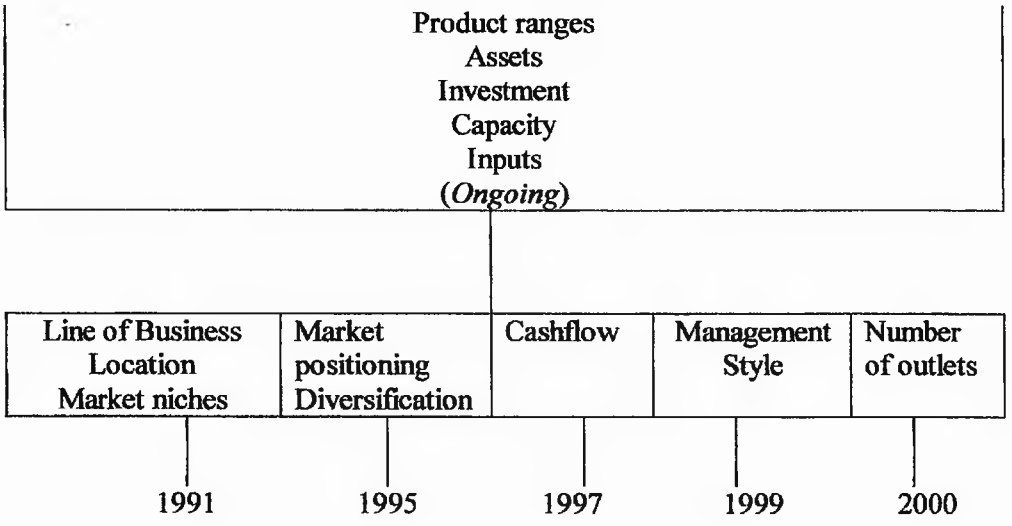
Firm E mainly engaged in near to market innovations developing about twenty new products and services since inception (e.g. new dishes, management of corporate and private events etc.) Primarily, firm E engaged in process innovations. The founder altered many of their processes in major ways to increase operational efficiency. For example, attractively presented meals are now delivered, warm and on time for serving at the location of the function. Firm E provides drinks, serving staff, a location for the event etc. In many cases, new staff carrying in knowledge initiated these process innovations.

The industry has encountered a lot of technical change over the life of the firm. Forces outside the industry initiated this change. Firm E generally was successful in implementing new technologies.

Organisational Change

Firm E engaged in a lot of restructuring over its life. On average firm E undertook fifteen key organisational changes, which is above the average level of firm-specific turbulence, undertaken by long-lived small firms in the sample, of eight key organisational changes. Firm E received a high performance score so it is perhaps reorganising to achieve greater growth given that firm-specific turbulence is a convex function of performance (see Volume I, Chapter8). The fifteen key organisational changes are presented in Figure 5.10. A number of key organisational changes clustered in 1991 and 1995. Firm E was experiencing a lot of firm-specific turbulence at these points. Most of the turbulence has occurred in the latter years of firm E's life (i.e. the past 10 years). From the list of organisational changes the owner-manager viewed changes in management style, cashflow and number of outlets as fundamental. These are described in order of importance below.

Figure 5.10: Key Organisational of Firm E



The owner-manager of firm E used to supervise the activities of all staff (i.e. a hierarchical style of management). By monitoring staff in this manner, the entrepreneur acted as a foreman rather than a manager. As the headcount of firm E increased, the supervision of staff became a full-time job. Three years prior to exercising the option to change the governance style of firm E, the owner-manager found that he was spending too much time following up on employees work rather than planning for growth and touting for business (i.e. marketing). This hindered the exercise of options to grow. The increasing headcount count, the desire for growth, and the misallocation of the owner-managers time monitoring employees precipitated this organisational change. To illustrate the gravity of the problem, the owner-manager pointed to the rising headcount in firm E. At the time of interview, firm E employed 100 staff members, twenty full-time and eighty part-time.

At present, the owner-manager entrusts employees to conduct their work efficiently and responsibly (i.e. empowerment). The owner-manager does not waste his energy following up on the work of employees any more. According to the owner-manager, "*If you train someone to do something you expect them to do the job. There is an element of trust involved.*" If the employee fails to keep this trust (i.e. to do their job correctly) the

owner-manager fires them. As a result, the employees who remain with the firm build on this trust and work more as a team.

Since adopting this style of management, the owner manager has been more careful about the type of staff that he hires and retains. Prior to initiating this change in management style, there was an equal number of full-time and part-time workers employed in the firm E. Now there are more part-time employees. The owner-manager pays staff more, but this is not the main incentive to work for firm E (i.e. workers are empowered). Relatively, employees skills have increased as workers with a higher level of human capital are retained. Operational efficiency improved, as the owner-manager of firm E is more concerned with the general management (i.e. process innovations, planning for growth etc.) and employees are working more effectively. More time has been invested in marketing. Firm E has entered new market niches and has achieved growth in profits, sales, capacity and cashflow. The financial structure of the firm E has altered. The positive signs of such consequential adjustments were visible just twelve months after changing the owner-managers management style.

A cash-flow crisis occurred in 1997. In the space of three months firm E's type of customer changed from small clients to large clients. As expressed by the owner manager, " *Contracts were no longer £1,000 but £20,000*". Without the means to receive payment for invoices upfront, firm E did not have the cashflow to conduct the work. The extension of credit is an important source of differentiation and firm E did not have enough cashflow to finance this credit policy. The founder of firm E was aware that he needed to finance the credit or risk losing the client's business. To solve this firm E exercised the option to enter into a cash flow agreement with the bank where they would provide money for invoices immediately (i.e. invoice discounting services) and manage payment from clients for a fee of £15,000stg per annum. This enabled the firm to purchase inputs for large orders. There was a downside to this solution. Firm E lost complete control over its relations with its customers. Mistakes have occurred where clients had been accused of non-payment in writing by the banks when in fact the client did pay. According to the owner-manager, "*You could lose customers over this*". When this agreement operates correctly, it fosters good relations with suppliers as they are guaranteed payment for inputs purchased. It has allowed the firm to grow further gaining

access to customers and new niches, which were otherwise outside its reach previously. Firm E could now compete for the custom of larger clients. One year later, firm E showed signs of increased profit, sales and cashflow.

Growth in the volume of output and sales precipitated the opening of a new outlet to distribute products. To compete effectively firm E needed a stronger presence in the market and greater capacity to produce high volume orders and distribute their products efficiently. Firm E purchased the outlet in another urban location in Scotland. A second outlet provided firm E with access to more buyers. After exercising the option to open the second outlet the owner-manager hired a manager to run the new outlet. Operational efficiency improved. Firm E was better positioned to exercise options to grow on the business.

Table 5.11: Flexibility Measures for Profile E

Change	Number of Precipitating factors	Precipitating Time (months)	Number of Consequential Adjustments	Adjustment Time (months)	Agility	Speed
Management style	5	60	12	12	0.42	72
Cashflow	6	3	9	12	0.67	15
Number of outlets	7	12	9	0	0.78	12
Average	6	25	10	8	0.63	33
All Firms	5	16	7	17	0.87	22

On average, firm E's agility score was less than 1 (0.63), implying that it had a low level of agility. The number of consequential adjustments was high relative to the number of precipitators particularly with regard to changes in management style. The founder of firm E acted quickly once he exercised a real option, rather than staging its resource commitments. However, firm E waited for real time information in responding to precipitating influences of change. Firm E had resolved any uncertainties prior to instigating the change, enabling him to act quickly. The three main changes instigated by firm E permitted it to exercise further options to grow on the business. In this way, Firm E also raised the flexibility of the business.

End Game

The founder expects the business to continue to trade into the future. He was unsure what the end game strategy would be adopted but he expressed a preference for an employee to take over the running of the business (i.e. a management buy out). The founder continues to run the business for the enjoyment. The business has met the expectations of the founder. He stated, "*I still find it a challenge*". He still wants to grow on the business.

Profile F: Corporate Design

Firm F provides corporate design and communication services for corporate customers. The entrepreneur, who has been the main driving force of the business, founded the firm in 1979. In 1990, the entrepreneur left the business to work in the England for six years. His partners continued to run the business. When the entrepreneur returned, the business was reconstituted (i.e. the clients and the technology base of the business changed significantly). Firm F still retained the original goodwill, although there have been a number of changes in the partners of the firm over time.

The founder set up the business to make a living and to receive a good return for the capital and effort invested in firm F. This is viewed as a positive motive for setting up a firm, see Storey (1994). The entrepreneur did plan for the first three years of the business and sought to grow the company. He envisaged the firm more than doubling in size over the first three years to approximately ten employees including the directors. He didn't feel that the business would grow beyond twenty full-time employees. According to the owner-manager, "*This size would be comfortable and manageable*".

After three years of trading, the entrepreneur believed the business had attained a long run equilibrium level of employment with eighteen fulltime equivalent employees and gross sales of £1.4million (constant 2001 prices). At the time of interview, firm F generated sales of £1million (constant 2001 prices) with an equivalent number of employees. Fulltime equivalent employment did not grow above 18 FTEs. Firm F scaled down its activities (i.e. lower turnover, lower headcount) considerably between 1994 and 1996 when the entrepreneur was working in England. The value of services also fell considerably during this period as a result of the widespread adoption of digital

technology. Further, a partner left the business in 1996 taking a great deal of work with him. According to the entrepreneur, the firm was much smaller following this incident but happier and more viable. By 2001, labour productivity, FTEs and turnover were on an upward spiral yet again. However, firm F never recaptured its level of labour productivity at inception ($91,000stg. per FTE).

The firm's activities had a high creative content, and involved producing images and various forms of documentary reports for its clients. Examples include corporate logos, annual reports, brochures, displays for exhibitions, newsletters and magazines. The owner-manager grouped these products into four main services, namely, graphics design (60% of sales), website design (35%), communication (2.5%) and consultancy (2.5%). Clients range from sole traders (e.g. local legal practices) to large corporations (e.g. a UK bus company).

Table 5.12: Scale of Profile F

Year	Sales (£000stg) (£000stg 2001)	FTEs	Labour Productivity (£000stg/FTE) ($000stg 2001/FTE)	Assets (£000stg) (£000stg 2001)
At start-up (1979)	180 247	2	90 124	8 11
At maturity (1982)	750 1,373	18	43 76	-
After 5years (1984)	1,500 1,743	17	88 103	-
After 10 years (1989)	1,000 1,504	17	59 88	
After 15 years (1994)	310 480	7	44 69	20 31
After 16 years (1995)	345 401	9	38 45	45 52
After 17 years (1996)	356 404	5	71 81	18 20
After 22 years (2001)	1,000	18	56	80

Market Characteristics

Firm F competes head-to-head with rivals in the Scottish market. It faces increased competition from ten major and many minor rivals. Competition was hostile and described as intense in every aspect. It has increased significantly since inception. When firm F was set up there were only two or three players in the market who were as

sophisticated. In any case, firm F's market share is small, under 1% in the firm's principal market for graphic design.

The products of firm F and the competitive offerings of its rivals were similar for the most part. However, in some niche markets firm F's products varied due to use of different technologies or specialised equipment. Firm F sells its products typically to customers in the middle to top ends of the market (i.e. high quality products at a medium price). It was easier to charge premium prices in the past. "*In recent years customers know and expect more*", stated the owner-manager. Firm F still has clients from twenty years ago, so there is some customer loyalty. The firm competes with rivals based on five dimensions, namely, price, quality, after sales service, tying up suppliers and marketing. This is just above the average of 4.5 dimensions in the sample of long-lived small firms. The firm is differentiating its product offering to cultivate a market niche. Its headcount is above the average of 13.5 FTEs in the sample of long-lived small firms, which perhaps explains its wider market reach.

Performance

At the time of interview, firm F earned £60,000stg. in profits in the last trading year (a rate of profitability of 75%). This is much higher than the sales margin of 6%. The rate of profitability may be much lower if intangible assets were included in the denominator (i.e. in the book value of assets). Firm F has very few physical assets (£80,000stg.). Firm F began with £11,000stg. in equipment (constant 2001 prices). Thus, the asset base grew six times since inception. This solely represents growth in the tangible asset base rather than intangible assets, which could be sizeable for a service-based firm, like firm F where a lot of its business is generated through goodwill.

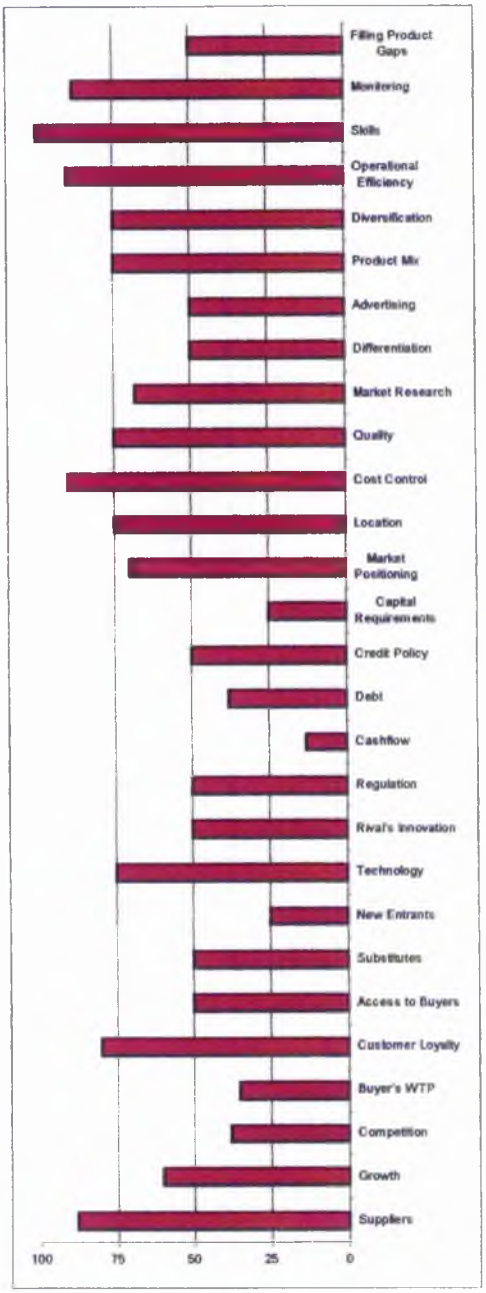
It is not unknown for firm F to report such high rates of profitability. In 1994 it reported net profits of £112,000stg., a rate of profitability of 560% and a sales margin of 36%. It estimates were more conservative for 1995. It reported net profits of £48,000stg, a rate of profitability of 92% and a sales margin of 13%. However again in 1996, it reported net profits of £202,000stg., a rate of profitability of 1122% and a sales margin of 57%. The low value of tangible assets and perhaps the failure to distinguish profits from income may explain these figures. Certainly, it illustrates the difficulties in gauging performance using objective measures in a small firms context.

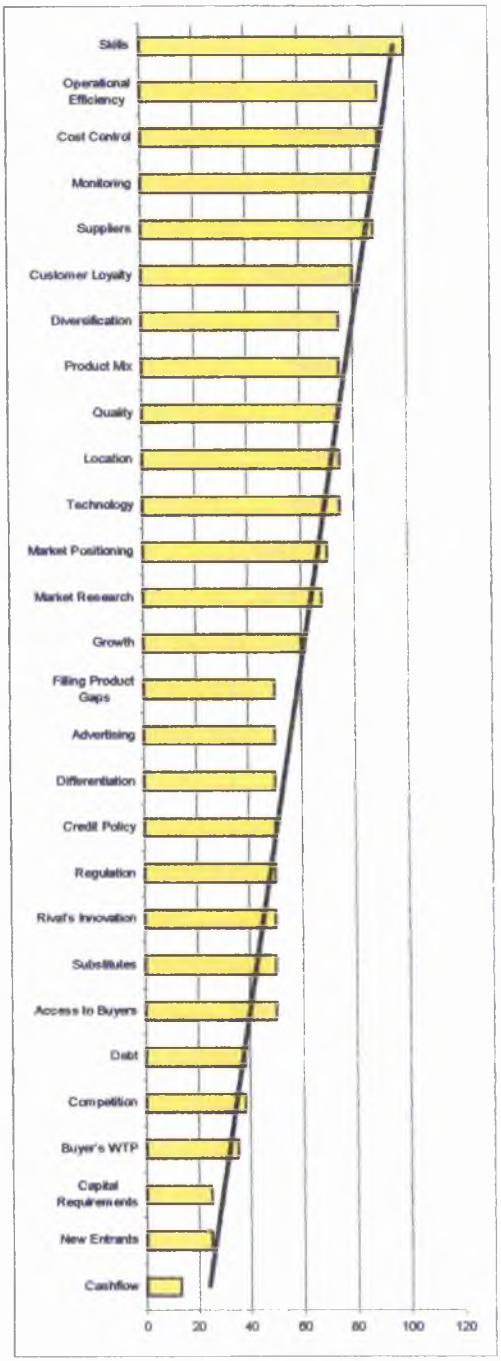
At the time of interview, firm F had three forms of debt namely, a bank overdraft, a bank loan and leasing agreements. Reid (1991) found that greater indebtedness is negatively related to small firm survival at inception. This may not be the case later in the small firms lifecycle. Many forms of capital structure could be appropriate at this stage, see Reid (2003). Other than these two sources of finance, firm F is funded by private equity.

Figure 5.11 presents the subjective performance ratings of the owner-manager of firm F for each scale item. Attributes which received a rating above 75 included suppliers, customer loyalty, cost control, operational efficiency, skills and monitoring. This is a professional services firm whose skills, knowledge and reputation is its primary source of value. Attributes, which received a rating below 50, included the competition, buyer's willingness to pay, new entrants, cashflow, debt and capital requirements. Mismanagement of the financial side of the business can severely undermine its performance as well as growth in competition.

In commenting on the performance ratings the owner-manager stated that the firm F's skills, cost control and operational efficiency primarily fostered the survival of the firm. "*Skills and experience inter-mingled or in other words expertise was most important*", stated the owner-manager. The human capital of firm F combined with its flexibility aided the firm in weathering downturns. Firm F also runs a tight ship. According to the owner-manager the firm doesn't have any real leaks in profitability and it keeps within budget. "*Even in base periods they ensure they don't get too deep into a*

Figure 5.11: Subjective Performance rating of Profile F





Overall Score: 61

hole", explained the owner-manager. Firm F offers the full range of services. Its staff performs tasks in an efficient manner. They work in teams but can access a broad range of knowledge. This enables them to serve big and small customers.

The overall score received by Firm F was 61, which is below the average of 67, for long-lived small firms in the sample. This score contrasts with its performance based on objective measures of performance. Firm F's recorded rate of profitability is considerably above the average in the sample of 33%. Its level of asset growth is below average. In fact as stated above, firm F has few tangible assets. The firm trades on its goodwill. This is not valued in traditionally accounting measures of performance.

Internal Organisation

At inception, the administrative organisation of firm F was highly evolved. Seven functions, namely, financial accounting, training of personnel, production of service, sales, maintenance, strategic planning and legal matters were all performed internally. At the time of interview, firm F also engaged in market research and information technologies (PCs, website etc.) were integrated into the functions of the firm.

The graphic design industry experienced a lot of technical change over the life of firm F, particularly with the emergence of new technology (i.e. digital technology). Generally the firm was successful in implementing these technologies. The business uses eleven forms of information technology. According to the owner manager, "*We cannot work without it. Everything we do is digital*". Thus, information technologies are very important to Firm F. The most advanced forms of I.T. used by firm F include e-mail, a website, ISDN/ADSL, telephone/video conferencing and electronic databases. Within the administrative organisation I.T. is used in networking, planning, monitoring performance, improving operational efficiency, market research, administration, design, external presentations and in managing dealings with buyers and suppliers.

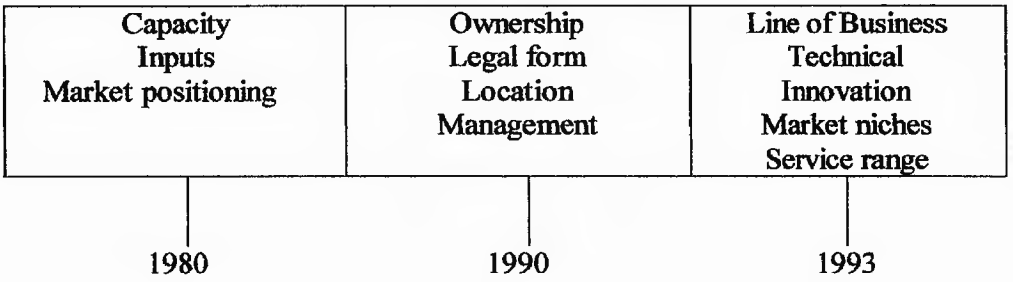
Firm F was innovative at inception, mainly through offering new services (i.e. understanding the clients needs). It took two years to build up experience following the entrepreneurial event. Firm F also faced difficulties in the recruitment of staff. However, since inception the entrepreneur stated that firm F developed nearly five new services. These enabled firm F to raise profits and grow market share. Product innovations of rivals place firm F under a lot of competitive pressure. Copyright and trademarks protect

innovations in the industry. Firm F made important process innovations modifying many of their processes in major ways. These process innovations chiefly were derived from new staff carrying in knowledge. Their rivals engage in a little process innovation. This also forces firm F to become more efficient.

Organisational Change

On average, firm F undertook twelve key organisational changes, which is above the average level of firm-specific turbulence, undertaken by long-lived small firms in the sample, of eight key organisational changes. Firm F received a low performance score of 61, so the firm is perhaps chopping and changing to survive in a very hostile environment given that firm-specific turbulence is a convex function of performance. The twelve key organisational changes are presented in Figure 5.12. Firm F was experiencing a lot of firm-specific turbulence at three points in time in firm F's life. The early years of trading and the early nineties were the most turbulent times for firm F. From the list of organisational changes, the owner managers viewed changes in technology, ownership and management style of high relative importance. These are described in turn below in order of significance placed on these changes by the founder.

Figure 5.12: Key Organisational Changes of Firm F



The graphic design industry as a whole was subject to the impact of a major precipitating factor, namely, the emergence of digital technology. Rivals could produce more output with new techniques. Orders were less time intensive. Firm F's biggest upheaval was adapting to digital technology – a step that was not taken without lengthy planning. While competitors were boosting their profits through the use of the new technology, the founder initiated a three-step plan to decide whether to take it onboard.

He was acutely aware of the potential for failing to successfully adopt the new technology.

The owner-manager invested one month in researching the market and the demands of their suppliers and trading partners for it. Then, firm F conducted a pilot test with digital software on three specially built websites. Finally, firm F hired a new team of people to deal specifically with that side of the business, see Judge (2002). While confident at this stage that the technology would prove successful with their clients they were astute enough to put Plan B in place. The entrepreneur in question said, "*We forged close links with other companies such as programming firms and internet service providers so that they could be sure that if the firm went cold on the digital technology those of their clients that were interested could still be serviced by someone else*", see Judge (2002). Here, the entrepreneur takes actions like staging commitments and planning routes back from failed experiments, which is consistent with a real options interpretation. As a consequence of the adoption of digital technology, Firm F entered new market niches in 1996. The capacity of the firm increased immediately and the rate of profitability per unit fell. There was an instant change in firm F's mix of customers and the functions of management.

The ownership of the firm changed in 1990 as the entrepreneur (or founder) was head-hunted to work for a company in England. Firm F altered the legal form of the business from a partnership to a private company with limited liability status. While the entrepreneur left the business to work in the England for six years, his partners continued to run the business. Limited liability status protected the liability of the entrepreneur against any potentially negligent action of the partners (i.e. now shareholders). This reduced the entrepreneur's risk and enabled the entrepreneur to retain a fifty percent share holding in the business. This was a wise strategy as the entrepreneur could exercise the option to return as owner-manager while also providing himself with a source of income and a property right. The business was reconstituted when he chose to exercise this option.

Following the change in legal form, the general management of Firm F altered (e.g. meetings were more formal). Formal meetings enhanced the owner-manager's ability to predict change or identify precipitators of change (e.g. pooling of trade

intelligence). Limited liability status influenced firm F's credit rating and its ability to raise finance. A flat hierarchy existed but there was a tendency to deepen this. All staff had written job descriptions. The employees of the Firm F had a stronger understanding of their role. There were staff appraisal meetings. This enhanced efficiency (in terms of cost control and operational efficiency).

Table 5.13: Flexibility Measures for Firm F

Change	Number of Precipitating Factors	Precipitating Time (months)	Number of Consequential Adjustments	Adjustment Time (months)	Agility	Speed
Technical	1	0	5	36	0.2	36
Ownership	1	0	4	0	0.25	0
Management	1	0	4	1	0.25	1
Average	1	0	4	12	0.23	12
All Firms	5	16	7	17	0.87	22

In adapting to organisational change, the entrepreneur stated, "*Whenever an opportunity presents itself we do not knock it, but always prepare thoroughly to satisfy ourselves the risk is worth it, and to be sure if things go wrong the effect will not be too damaging. We don't rush headlong into anything*". Firm F stages its commitment to real options only making irreversible investments when uncertainties are resolved. Particularly, in cases that there is a greater downside risk to the financial position of the firm (e.g. investment in digital technology). The level of agility is low (approximately 0.2) as firm F undertakes organisational change after identifying the first precipitator. After early signs of change, firm F acts in ways to explore options for change, putting contingency plans in place, undertaking market experiments etc. This sets in motion a chain of real options. The method adopted by firm F is consistent with a real options approach.

End Game

The entrepreneur expects the business to continue to trade into the future. The owner-manager of firm F is unsure what end game would be adopted at this stage, but a preference was indicated for the transfer of ownership of the firm to an employee. He wanted a business, which could be passed onto the staff. Twenty-two years later the owner-manager continues to operate the firm to provide him with employment. The

business has met the expectations of the founder. He stated, "*It is better than a real job. I get up each morning and I want to do better. The job is interesting and stimulating*".

Profile G: Soft Furnishings

Firm G manufactures made to order curtains and soft furnishings to a high standard for professional and domestic buyers. The entrepreneur founded this firm in 1988 and developed the business from employing three to thirteen full-time equivalent employees generating turnover of £224,000stg. Firm G is a sole proprietorship operating from a business premises and was one of the youngest firms (13 years old) in the sample of long-lived small firms at the time of interview.

The entrepreneur believed that firm G has not yet reached a long-run equilibrium value of turnover and employment. Turnover and full-time equivalent employment have been on an upward spiral since inception (i.e. Both measures grew three-fold). However increases in the level of turnover have not been large enough to lead to increases in labour productivity (i.e. level of turnover per FTEs), see Table 5.14. At the time of interview labour productivity was half its level in real terms than at five years of trading. Labour productivity at £17,000stg per FTE at the time of interview was considerably below the average level of labour productivity of £64,427stg. per FTE. in the sample of mature small firms. This suggests that firm G needs to adjust its headcount downwards to raise its level of operational efficiency.

Firm G sources materials from an extensive worldwide network of suppliers and coordinates, measures, manufactures, and fits a wide range of products. Sourcing materials from this network of suppliers enables firm G to guarantee quality whilst maintaining a competitive pricing policy. A full swatch service is provided for the perusal of customers where they can select fabrics and complimentary linings and trimmings in the showroom on site. Firm G produces many products to customer specifications, for example, chair covers, duvets, pillows, cushions, roman blinds, curtains, bedspreads, head pelmets and small chairs. The variety of products can be grouped into three similar types of products namely, soft furnishings (80% of turnover), upholstery (5% of turnover) and fittings (10% of turnover).

Table 5.14: Scale of Profile G

Year	Sales (£000stg) (£000stg 2001)	FTEs	Labour Productivity (£000stg/FTE) (£000stg 2001/FTE)	Assets (£000stg) (£000stg 2001)
At start-up (1988)	35 60	3	12 20	1 5
After 5 years (1993)	142* 178	5	28 36	
After 6 years (1994)	150 180	6.5	23 28	7 8
After 7 years (1995)	153 178	7	22 25	16 19
After 8 years (1996)	153 173	7.5	20 23	40 45
After 10 years (1998)	150 165	8	19 21	
After 13 years (2001)	224	13	17	80

Market Characteristics

Firm G principally serves clients in the Scottish market. Amongst their customers they count domestic users, a number of interior designers, who themselves have a range of high profile customers and a large department store which has shops in many cities in Scotland. Firm G has enjoyed substantial growth by providing an extremely high quality service in a specialised market (i.e. a contested niche). Firm G competes with other similar workrooms and with small "one person" outfits that operate from home with low overheads. It also faces different competitors in the workroom than in the showroom, which retails fabrics. Clients of the showroom are domestic buyers in the local region. Firm G could distinguish between four major rivals (two in the work room and two in the show room) and only three minor rivals in the workroom but a lot in the showroom. The entrepreneur is not concerned with the actions of minor rivals. In fact minor rivals cooperate with firm G in their role as customers and in their role as suppliers of inputs for the workroom (i.e. co-opetition).

In the principal market for high quality soft furnishings in Scotland, firm G's market share is less than 10%. Competition was described as strong but weak in some aspects. The intensity of competition has remained the same over time. The business is

capacity constrained. It operates at approximately ninety percent of this capacity under normal business conditions. As the products in the workroom are identical to that of rivals, firm G and its competitors often subcontract orders to rivals if their workrooms are too busy. According to the owner-manager, "*If you cannot beat them join them*". Firm G often subcontracts large volume orders but conducts the more intricate work in their own workroom so that they can control the quality of this more stringently. This reduces agency costs and limits the transfer of idiosyncratic knowledge.

Firm G sells their products typically to customers at the top end of the market (i.e. high quality products at a premium price). Clients were unable to purchase products of such high quality in retail outlets. At inception, the owner-manager underestimated her skill as a seamstress. As the owner-manager learned of her skill over time, firm G repositioned itself to clearly serve the needs of customers in this niche. The firm competes based on six dimensions namely price, quality, new product development, after sales service, delivery and marketing. This is above the average in the sample of 4.5 dimensions. In servicing this niche market, the firm has increased in scale over time. However, the firm remains a small-scale operation.

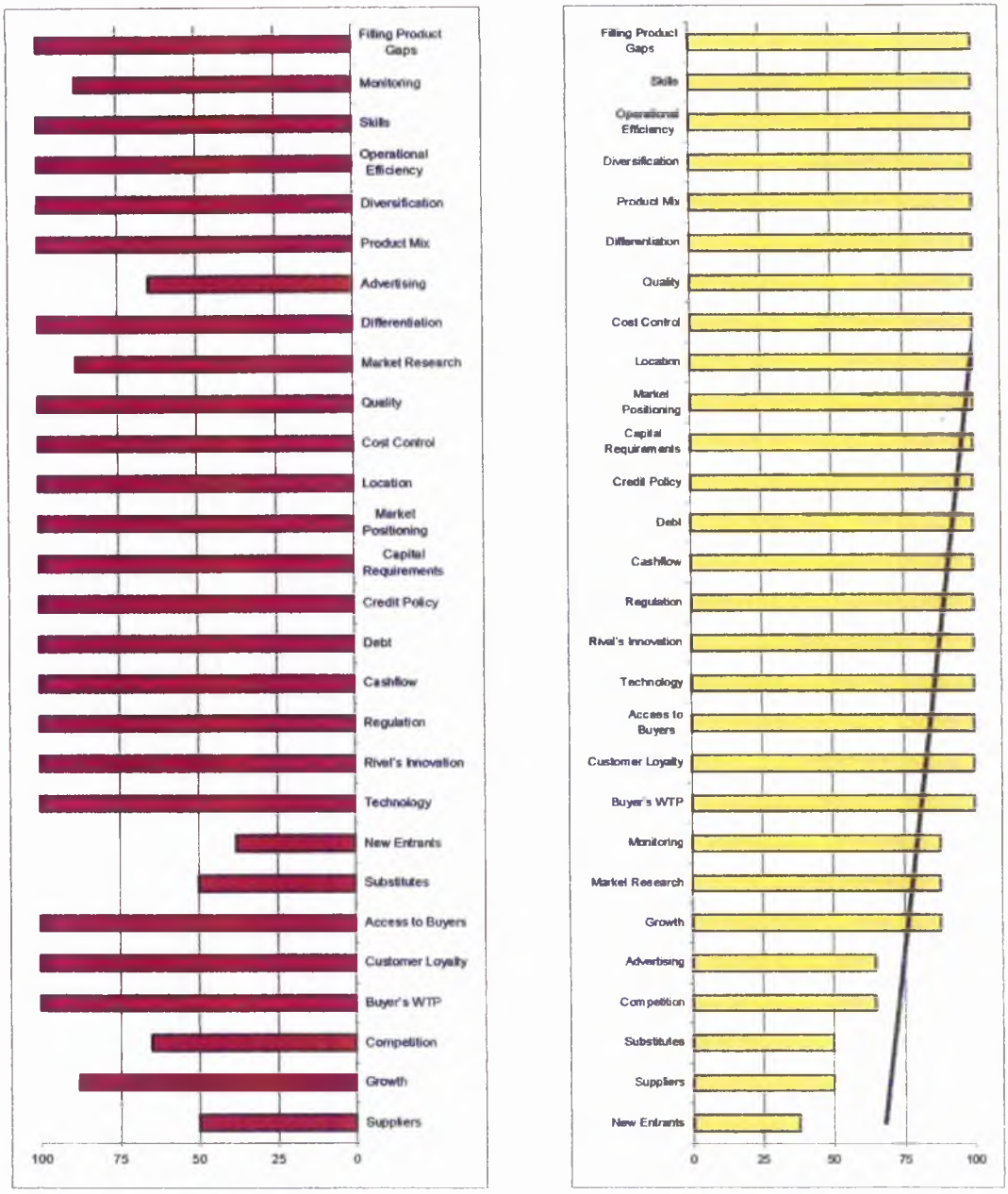
Performance

Firm G earned £44,000stg. in profits (a rate of profitability of 55%) in the last trading year. This rate of profitability may be much lower if intangible assets were included in the denominator (i.e. in the book value of assets). Firm G has very few physical assets (value of £80,000stg. in 2001). A similar pattern is found if firm G's rate of profitability earlier in its life is examined. Firm G's rate of profitability in 1994 was 71%. At this time it earned net profits of £5,000stg. on assets valued at £7,000stg. In 1995 its rate of profitability was high also at 59% (i.e. It earned net profits of £9,500stg. on assets valued at £16,000stg.) Over time firm G's net profits rose in real terms. However, the figures for the rate of profitability of firm G do not spark confidence in this performance measure because of the failure to account for the value of the intangible asset base in the denominator. Firm G began with £8,000stg. worth of equipment (constant 2001 prices). The asset base grew nine-fold since inception. This solely represents growth in the tangible asset base rather than intangible assets, which could be sizeable for a firm like firm G where a lot of its business is generated through goodwill.

At the time of interview firm G had one form of debt, namely a hire purchase agreement. It has not sourced any outside equity finance. Other than this source of finance, firm G is funded by private equity illustrating that long-lived small firms have a clear preference for this source of finance (see Reid, 2001).

The owner-manager in rating firm G's performance on each item comprising the multidimensional scale gave most attributes except suppliers, growth, substitutes, new entrants, market research, advertising and monitoring a rating of 100 (see Figure 5.13, which presents the performance ratings of firm G for each scale item). These items represent threats and areas where the owner-manager felt there was room to improve. The overall score received by the firm was 90, which was the maximum performance score in the sample of long-lived small firms. In this case the owner-manager perhaps over estimated the firm's performance. Smith (1999) did find that firms in the early stage of their lifecycle were prone to exaggerate their own strengths and to underestimate the threats from rivals and other factors external to the firm. It potentially shows poor understanding of the primary determinants of the firm's performance.

Commenting on the performance ratings, the owner-manager stated that the skills of the firm primarily fostered its survival. A lot of time is devoted to the training and development of staff. The diversification into the retail of fabric also helped the firm to weather downturns. The final factor, which the owner-manager pointed to was her own determination to drive the business forward.



Overall Score: 90

Figure 5.13 Subjective Performance Rating for Profile G

Internal Organisation

At inception, the internal organisation of this firm was highly evolved. Eight functions such as accounting, training of personnel, production, sales, market research, after sales service, strategic planning and innovation were all performed internally. Two extensions were made to the administrative organisation. The retail of fabrics in the showroom was undertaken in 1990. In 1998 computers were purchased and used in the general administration of the business. At the time of interview, there were broadly three layers of hierarchy. At the top of the hierarchy, the owner-manager was responsible for the development of the business. An operations manager, an administration and accounts member of staff and a delivery and collection member of staff supported the owner-manager at the next level of the hierarchy. There was eleven workroom staff at the bottom layer of the hierarchy.

Firm G was innovative through its development of new products and services. Over its life firm G developed more than twenty new products and services (100+). These enabled the firm to raise profits and grow market share. However, the product innovations of rivals placed them under some competitive pressure. Firm G made important process innovations modifying many of their processes in major ways. These process innovations were initiated by a diagnostic report produced by Investors in People Programme and are discussed further below.

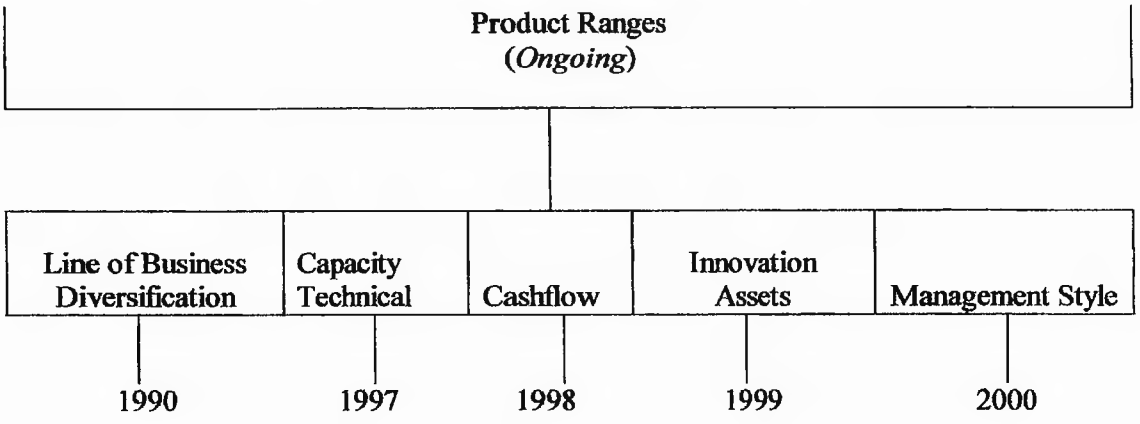
The business uses eight forms of information technology, slightly above the average of seven forms of I.T. in the sample. The most advanced included: e-mail, a website, internet, electronic databases (e.g. SAGE). These are important to their business and are used in planning, monitoring performance, improving operational efficiency, market research, administration and managing dealings with buyers and suppliers.

The industry experienced a lot of technical change over the life of the firm. An acknowledged leader in the industry initiated this change. Generally, the firm was successful in implementing these technologies.

Organisational Change

On average, firm G undertook nine key organisational changes, which is just above the average level of firm-specific turbulence of eight key organisational changes undertaken by long-lived small firms in the sample. Firm G received a high performance score of 90 implying that the firm is chopping and changing to grow in a very hostile environment given that firm-specific turbulence is a convex function of performance. The nine key organisational changes are presented in Figure 5.14. From the list of organisational changes identified, the owner-manager viewed changes in technology, diversification and management style of higher relative importance. These three changes are described in turn below in order of the significance placed on these changes.

Figure 5.14: Key Organisational Change for Profile G



The technical side of the business changed with an upgrade in technology from single needle to automatic needle. This was precipitated by increased demand. Firm G received larger contracts. To grow further and to raise profitability, firm G needed to increase the operational efficiency of its operations. With this in mind, firm G exercised the option to purchase new sewing machines. The owner-manager of firm G wished to ensure that the implementation of the new technology would successfully increase operational efficiency. This precipitated the sole proprietor to examine the efficiency of existing organisational routines and processes. She decided that the staff needed more space to conduct their work efficiently. To achieve this the entrepreneur undertook three further adjustments. First, the storeroom was cleared. This provided staff with more

space to work. The existing table space was extended and rearranged to make the most efficient use of this space. Firm G also purchased a new iron. The automatic machines improved the quality and presentation of the work. This resulted in further increases in demand, which positively influenced sales, profits and cashflow. The workforce's level of motivation and efficiency increased with improved working conditions. Relative skills of employees improved following training on the new machinery. Firm G was now able to compete for larger contracts from new types of customers. Headcount increased to cope with larger contracts.

Firm G exercised the option to diversify through retailing fabric after loosing two large customers within the space of nine months. These two customers ceased trading. Firm G was highly dependent on the orders of these customers. These contracts represented seventy five percent of the annual output of the workroom. Sales, cashflow and profits fell significantly. The entrepreneur knew that firm G had to diversify to survive. Firm G exercised the option to open a showroom, which retailed fabric. Firm G started a marketing campaign for this showroom. The customers of the showroom were different. They are mainly domestic customers in the local region. Sales in the showroom were small in volume but it was mainstay business and complemented the workroom. It reduced firm G's exposure to poor performing customers but did not eliminate it. In general, only 10-15% of turnover is generated from the showroom. The remainder is generated from the workroom. It took three and a half years for the customer base to grow again and for the firm to return to profitability. The business struggled for five years in total. The sales in the show room helped them through this difficult time. This is an example of a fallback strategy to minimise downside risk in event of customers ceasing to trade. It reduces the dependency of turnover on the workroom. The recovery period of firm G may have been shorter if the owner-manager had the foresight to open the showroom at start-up.

Firm G competes in a niche market, which demands a high quality service and responsiveness to ever changing customer requirements. The entrepreneur acknowledges that if the firm is to succeed and grow it requires a flexible and highly skilled workforce. As firm G grew in size (i.e. headcount increased) the owner-manager was aware that changes in the organisational structure (i.e. layers of hierarchy etc.) of the firm were

required to increase operational efficiency and the flexibility of the workforce. New and existing staff needed a structured training system. At this point, the owner-manager was the main point of contact. The owner-manager was prioritising day-to-day operations rather than delegating this role to a manager. The entrepreneur took a careful and planned approach in changing her style of management. Firm G obtained external advice on the organisational structure of firm G by joining a programme called Investors in People. Advisors analysed the existing structures of the business and produced a report. Currently, the Firm G is implementing the recommendations of this report.

Firm G has broken down the operations of the business in terms of skill areas and has developed a skills matrix, through which each and every member of staff, regardless of whether they are part-time or full-time, is being developed. Performance appraisals with staff take place on a six monthly basis. These represent an opportunity for the owner-manager to discuss the progress and development needs of each staff member.

Within the context of the business, firm G has some highly skilled members of staff who in turn develop other members of staff. There is a strong sense of teamwork and a willingness to develop each other. The organisation has moved from having a distinct dependence on certain members of staff with key skills, who if off sick would hold up production until their return, to having a far more flexible workforce dependent on no one member of staff. According to the owner-manager, this has enabled the growth to date and will be a critical success factor in serving further anticipated growth.

The skill matrix is a simple but extremely effective way of articulating the skill needs of the business and its future development needs. For example, firm G may require a minimum of three staff members to make roman blinds. From the skill matrix the firm is aware that only two staff members are trained in this task. The firm is a vulnerable position unless at least one other staff member is trained in this task. In this way, the matrix enables the firm to identify the gaps and put in place development actions to overcome these.

Once the new organisational structure was put in place, the owner-manager was able "*to work more on the business than in the business*". The entrepreneur invested more time on market research, training staff and improving the skill level of employees. The employees have greater responsibility but with this came more accountability (i.e.

empowerment). Working towards the standards set by the Investors in People Programme gave the organisation the structure and focus to change employee behaviour. Firm G recognises the benefits derived from the journey to date have been considerable in terms of growth in turnover, skill levels of staff and customer satisfaction.

Table 5.15: Flexibility Measures for Profile G

Change	**Number of Precipitating Factors**	**Precipitating Time** (Months)	**Number of Consequential Adjustments**	**Adjustment Time** (Months)	**Agility**	**Speed** (Months)
Technical	8	24	16	60	0.5	84
Diversification	6	12	11	42	0.55	54
Management	9	66	10	0	0.9	66
Average	7	34	12	34	0.62	68
All Firms	5	16	7	17	0.87	22

In adapting to organisational change the entrepreneur takes a planned approach Firm G stages its commitment to real options. The average level of agility is less than one (0.62) as firm G undertakes a higher absolute number of consequential adjustments relative to the number of precipitators of change. Firm G adopts a "wait and see" approach before implementing organisational change. The firm investigates the precipitating causes of change for optimal solutions (e.g. studying work processes in the work room, seeking external advice). Once the founder has an understanding of all the variables precipitating change she structures her response. The consequential adjustments or commitments are staged.

End Game

The owner-manager continues to run the business to provide her with employment. The business has exceeded her hopes for it as it achieved a lot of growth (i.e. from sewing curtains at home). The owner-manager finds it a challenge. According to the owner-manager, "*You need to be multi-skilled to survive as at times you need to change direction*". The owner-manager expects the business to continue to trade into the future. The entrepreneur was unsure which end game was likely to be adopted but a trade-sale was suggested. This firm is young (approaching half a generation) in comparison to other firms in the sample of long-lived small firms. An end game is not the primary concern of the business at this stage.

5.2 Conclusions

The seven enterprise profiles illustrate the diversity of the long-lived small firms in the sample. The qualitative observations on the enterprise profiles enliven the quantitative results presented in volume I. The enterprise profiles are presented in a common format to enable the reader to compare the analytical categories across the cases. To aid in this regard, this Section concludes this Chapter by presenting a cross-site analysis of the enterprise profiles.

Table 5.16 presents information on changes in scale of enterprise profiles A to G. Annual growth rates over a five-year period and over the life of the firms are calculated for FTEs, real turnover and real labour productivity (at constant 2001 prices). Annual growth rates in real assets at constant 2001 prices over the life of the firm are also computed. In general, we find that turnover and full-time equivalent employment grows considerably faster in the early years of trading than in the latter years. Annual growth rates over the first five years of trading are generally higher than annual rates over the life of the firm. This supports empirical evidence presented in Volume 1, Section 5.25. The enterprise profiles (A, B, D) adjust the headcount of the firm downwards to maintain or raise labour productivity in the latter years of trading. However, in four out of seven profiles (A, B, E, G) labour productivity fell over the life of the firm. Real asset growth was substantial mainly in manufacturing firms (A, D, G) except for one services based firm, profile E, the contract caterer.

Table 5.16: Changes in Scale of Firms A to G

Firm	A		B		C		D		E		F		G	
	5yrs	*life*	*5yrs*	*life*	*5yrs*	*life*	*5yrs*	*life*	*5yrs*	*life*	*5yrs*	*life*	*5yrs*	*life*
FTE Growth	3%	-0.6%	140%	17%	11%	2.2%	38%	25%	180%	268%	160%	36%	13%	26%
Real Turnover Growth	13%	-1%	17%	5%	37%	7%	1.5%	63%	82%	91%	91%	14%	39%	21%
Labour Productivity Growth	9%	-0.9%	-15%	-3%	17%	0.3%	-12%	7%	-10%	-3%	-8%	-2%	16%	-1%
Real Asset Growth	-	172%	-	18.5%	-	18%	-	524%	-	682k%	-	29%	-	115%

Note:

Growth is calculated on a) a per annual basis for the first five years of trading and b) on a per annual basis for the number of years the firm was trading.
All monetary figures used in calculation of the growth rates were measured in 2001 constant prices including labour productivity growth

Table 5.17 presents information on the market characteristics of enterprise profiles A to G. Relatively smaller sized firms (as measured by FTEs) tend to have a broader competitive space and cultivate niche markets (B, C, G) to survive whereas larger sized firms have to compete head-to-head with competitors on fewer dimensions (in some cases) in hostile markets (A, D and E) (see Table 5.17). The market reach of larger firms was extended over time. Larger small firms such as profiles A, D, E tend to serve primarily the UK market but they also have some international customers. The converse is true of relatively smaller small firms. They supply the Scottish market or regional markets within Scotland (see Table 5.17). Furthermore, most of the long-lived small firms in this sub-sample serve the needs of customers in the middle to top ends of the market. Their product offerings tend to be similar to those of competitors in this end of the market and as a result competition is either intense or strong but weak in some aspects (i.e. strong price or quality competition but weak on aspects such as delivery etc.). They face competition from over three major competitors and many more minor competitors in the fringe of their market niche. In general, the market share of this sub-sample of long-lived small firms is low (i.e. under 1%) as a result.

Table 5.17: Market Characteristics of Firms A to G

Firm	A	B	C	D	E	F	G
Main Market	U.K.	Scotland	Regional	U.K.	U.K.	Scotland	Scotland
Competition	Head to head	Niche	Niche	Head to head	Head to head	Head to head	Contested niche
# Major rivals	4	6	0	20	3	10	4
# Minor rivals	3	6	4	35	100's	100's	3
Intensity of Competition	Strong but weak	Intense	Weak but strong	Intense	Strong but weak	Intense	Strong but weak
Market share	25%	2.5%	Under 1%	15%	Under 1%	Under 1%	<10%
Product Differentiation	Similar	Different	Similar	Similar	Different	Similar	Identical
Size of competitive strategy space	2 dimensions.	4 dimensions.	5 dimensions	8 dimensions	6 dimensions	5 dimensions	6 dimensions
Market position	Low end	Middle	Top end	Middle	Top end	Mid/Top	Top end

Generally, long-lived small firms, which engage in manufacturing, have much larger asset bases than long-lived survivors engaged in services (see Table 5.1). Failure to value the intangible asset base of the business, a sizeable component of the resources of service firms explains this phenomenon. This has significant consequences in comparing the performance of long-lived small firms using conventional measures such as asset growth rates and rates of profitability etc. Measures of the rate of profitability presented in Table 5.18 for profiles F and G are extremely high at 75% and 55%. Both of these firms have low tangible asset bases. However, goodwill, which may be a sizeable component of the intangible asset base, is not accounted for in the calculation of these figures. If it is reasonable to assume that the value of the goodwill increases as the firm ages, the inaccuracies of conventional measures of performance such as the rate of profitability increases as the small firm ages. This is particularly the case for long-lived service firms.

In self-appraising the long run prospects of the firm owner-managers rate items highly, which reflect the strengths of the firm and rate weaknesses or threats lowly. The items characterise the underlying dimensions of the performance of the long-lived small firms or the variables, which the owner manager juggles to earn a living on a daily basis. Environmental items tended to receive neutral ratings except for firm D, which competed on international markets. Table 5.18 presents the list of items which received a high performance rating (i.e. > 75) and those which received a low performance rating (<50) for profiles A to G. Factors which tend in general to foster survival in the majority of cases include suppliers, quality, customer loyality, technology, cashflow, product mix, diversification, operational efficiency, skills and product differentiation. Factors, which inhibit firm survival in the long run, in the majority of cases, include new entrants and buyers willingness to pay. A clear one-to-one correspondence in the performance ranking of firms was not found between the objective measure of performance (i.e. rate of profitability) and this subjective measure of performance (i.e. the long run performance indicator). This does not negate the subjective measure of performance because a number of difficulties in capturing the performance of the firm using objective measures of performance were also found.

Table 5.18: Long-term Prospects of Firms A to G

Firm	A	B	C	D	E	F	G
Rate of profitability	15%	0.5%	-2%	10%	23%	75%	55%
Long run performance	65	63	72	67	70	61	90
Items which foster survival	G, CL, Abuy, T, CF, CC, Q, Pmix, Divers and OE	S, Abuy, T, Q, Divers, and Sk	S, CF, CP, MP, Q, MR, diff. and Pmix	S, G, CL, Sub, R, T, CF, CR, L, Q, diff., Pmix, divers, Sk and OE	S, C, CL, Abuy, T, R, CF, CP, L, Q, Pmix, diff., Ad. and divers.	S, CL, CC, OE, Sk. and Mon.	G, CL, R, T, CF, CR, L, Q, diff., Pmix, divers., Sk, OE, FPG, CC, MP, CP, D, CF, RI, Abuy, BWTP, mon. and MR
Items which inhibit survival	MR, BWTP, and R	CF, CP and C	Sub and R	NE and BWTP	CR, NE and RI.	C, BWTP, NE, CF, D and CR	NE

Notes:

Items which foster survival: S = suppliers, G = growth, C = competition, BWTP = buyer's willingness to pay, CL = customer loyality, Abuy = access to buyers,Sub = substitutes, NE = New Entrants, T= technology, RI = rival's innovation, R = regulation, CF = cashflow, D = debt, CP = credit policy, CR = capital requirements, MP = market positioning, L = location, CC = cost control, Q = quality, MR = market research, Diff.= differentiation, Ad = Advertising, PMix = product/service mix, Divers. = Diversification, OE = operational efficiency, Sk= skills, Mon = Monitoring, FPG = Filling product groups.

Items which inhibit survival: S = suppliers, G = growth, C = competition, BWTP = buyer's willingness to pay, CL = customer loyality, Abuy = access to buyers, Sub = substitutes, NE = New Entrants, T= technology, RI = rival's innovation, R = regulation, CF = cashflow, D = debt, CP = credit policy, CR = capital requirements, MP = market positioning, L = location, CC = cost control, Q = quality, MR = market research, Diff.= differentiation, Ad = Advertising, PMix = product/service mix, Divers. = Diversification, OE = operational efficiency, Sk= skills, Mon = Monitoring, FPG = Filling product groups.

Long run performance: Self appraised indicator of performance of the firm over the long haul which ranges from 0 to 100.

The internal organisational structure of these small firms was highly evolved at inception except for profile E which started with one employee, the owner-manager (see Table 5.19). At start-up, the latter only preformed 4 activities but this increased over time to 9 activities on par with the scope of the administrative organization of the other case profiles. Small firms which were older underwent a technical revolution with the use of PCs in their business in the mid to late nineteen eighties (i.e. a cohort effect). All the firms perceived information technology to be important. They owned over seven forms of information technology and these were found to support at least three of the operations of the small firms. The primary innovation of these small firms occurred at inception with the entrepreneurial event. Yet many of the firms (B, C, E, G) created twenty or more new products or services since inception. Most of their product innovations were near to market and prompted by the requests of customers. Enterprise profiles E and G undertook a number of process innovations over the life of the firm to improve the quality of service provided to clients and to increase the operational efficiency of work practices. All the firms operated in industries which had experienced a lot of technical change since inception.

Table 5.19: Internal Organisation of Firms A to G

Firm	A	B	C	D	E	F	G
Extent of internal org.at start-up	8 activities	9 activities	7 activities	8 activities	4 activities	7 activities	8 activities
Extent of internal org. at interview	9 activities	10 activities	10 activities	10 activities	9 activities	9 activities	11 activities
Product Innovation	8 products	> 20 products	> 20 products	15 products	20 products	5 services	> 20 products
Process Innovation	Important	Significant	Slight	Slight	Significant	Important	Important
Forms of I.T.	7	11	7	8	7	11	8
Uses of I.T.	6	7	3	7	6	10	5
Technical Change	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Most of the case profiles undertook a lot of organisational change (greater than the average of eight) over the life of their firm as approximated by the measure of firm-specific turbulence (see Table 5.20). Some were chopping and changing to survive others was trying to grow on the business or a mixture of both. Key changes which were identified by two or more firms as one of the three most important changes in the running of their firm included changes in management style, ownership, technology, cashflow, line of buiness, assets, diversification and product range. None of the firms had an average agility score greater than 1, indicating that each firm had to make a considerable number of adjustments in response to precipitators of change. Firm C is the only firm which had an agility score higher than the average in the sample of 0.87 (see Table 5.20). As regards speed of adjustment, enterprise profiles F and B responded to change faster than the average time of 22 months whereas profiles A, C, D, E, and G took considerably longer in responding to precipitators of change.

The logic of real options was useful in explaining how firms respond to organisational change (Bowman and Hurry, 1993; Luehrman, 1997, 1998; McGrath, 1997, 1999). Most firms adopt a 'wait and see' strategy to resolve uncertainties before making irreversible investment decisions (MacDonald and Seigal, 1986). Some adopt a more planned approach than others or try to test the influence of the change through market research experiments. They implement smaller and tactical adjustments first, which are easier to reverse until uncertainties are resolved. They put secondary plans in place to minimise downside risk in event of abandonment of planned change. They try to alter their own environment to reduce uncertainties.

Table 5.20: Characteristics of Key Organisational Changes of Firms A to G

Firm	A	B	C	D	E	F	G
Firm specific Turbulence	8	10	13	10	15	12	9
Key Change 1	Product range	Market Niches	Innovation	Ownership	Management Style	Technology	Technology
Key Change 2	Assets	Product range	Line of business	Assets	Cash-flow	Ownership	Diversification
Key Change 3	Cashflow	-	Diversification	Line of Business	Number of outlets	Management Style	Management Style
Avg.Precipitator	4	1	3	4	6	1	7
Avg.Precip.Time	20	4	46	11	25	0	34
Avg. Adjustment	7	3.5	4	10	10	4	12
Avg. AdjustTime	24.7	4.5	12	36	8	12	24
Avg. Agility	0.57	0.29	0.92	0.42	0.63	0.23	0.62
Avg. Speed	48	8.5	58	47	33	12	68

As the owner-managers of these firms approach thirty years of age they are considering end-games for the firm. All the cases believe that the business can continue to trade into the future. A wide variety of end game strategies were illustrated. Family succession was only identified as a possibility in two cases (A and C) (see Table 5.21). Successful cases of family succession where idiosyncratic knowledge was transferred from father to son and unsuccessful cases where certain aspects of the idiosyncratic knowledge could not be transferred were discussed above. In family succession the interest of siblings and the parents are clearly aligned prior to the transfer of ownership. Similarly there seems to be a close alignment in the interests of the founder and his employees in a management buyout. There was a distinct preference for a management/employee buyout over the trade-sale of the business to a rival competitor or an outsider (see Table 5.21). Owner-managers approaching retirement age either train existing management to take over the running of the business or recruit managerial talent in the labour market. The owner-manager mentors the employees as a father mentors a son or daughter in the running of the business. Another interesting feature of the cases is that these long-lived small firms can change ownership a number of times, not only within the one family but also from one family to an employees family etc (see profile D). Changes in ownership are seen as a key source of organisational change for the firm. The new owner sets out to grow and rejuvenate the firm.

Table 5.21: End-Games of Firms A to G

Firm	A	B	C	D	E	F	G
End-game	Family succession to 3rd generation / Trade-sale	Disposal of assets/ employee buyout	Family Succession to 2nd generation	MBO	MBO	MBO	Trade-sale